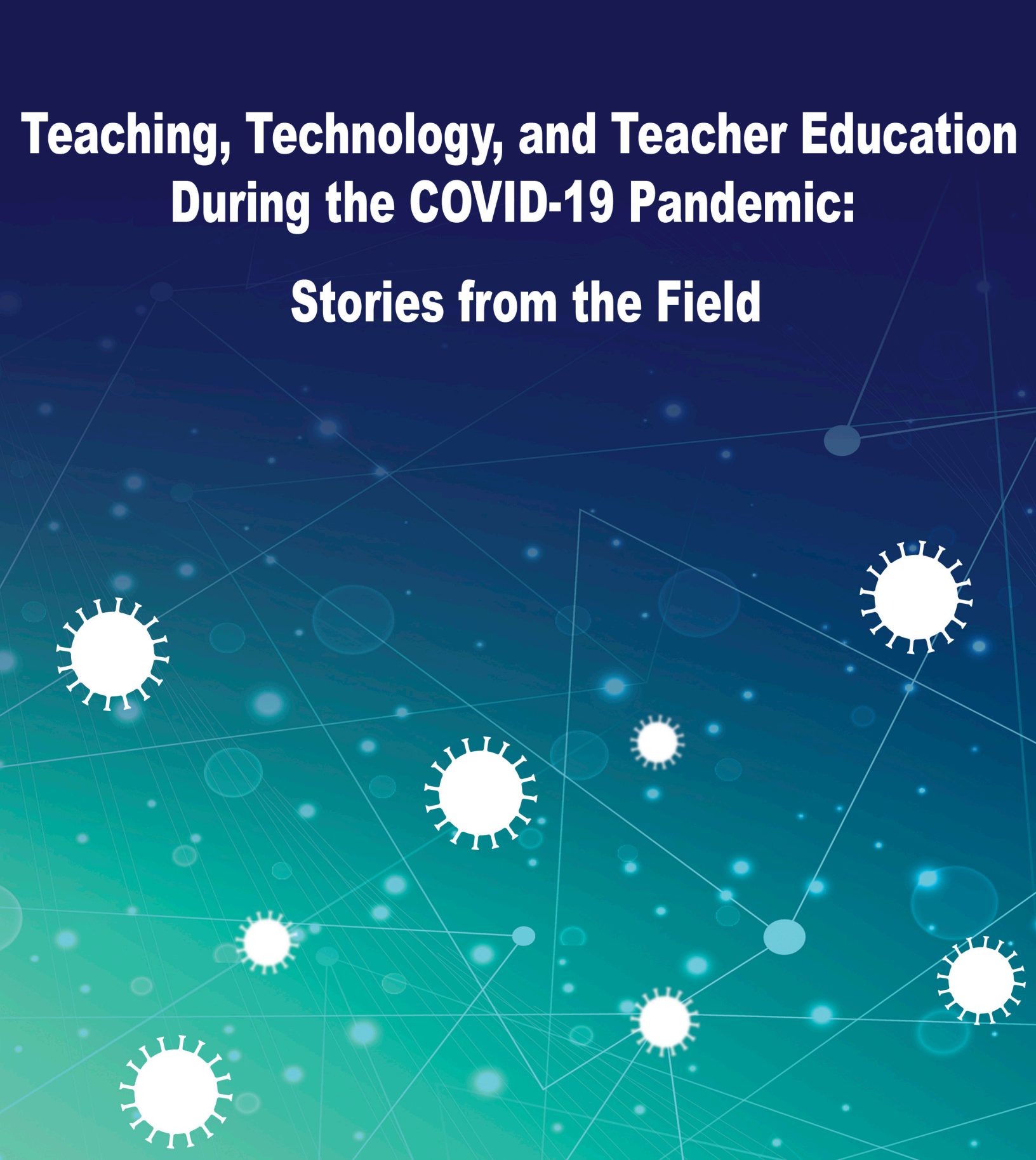# Teaching, Technology, and Teacher Education During the COVID-19 Pandemic:

Stories from the Field

EDITORS

Richard E. Ferdig

Emily Baumgartner　　　**Richard Hartshorne**

Regina Kaplan-Rakowski　　　**Chrystalla Mouza**

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(1 Thessalonians 5:11; ESV)

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Introduction

The COVID-19 pandemic brought frightening headlines. Each day dawned with news highlighting the number of cases (and deaths), the contagiousness of the disease, the lack of a cure or vaccine, and the scarcity of personal protective equipment for our healthcare and other frontline workers. One of the few positives was the speed at which many global partners joined to battle the disease. Academic researchers and even academic journals joined in the fight. For instance, in addition to giving open access to articles, many medical journals switched to a speedier review to be able to quickly publish promising results. So, as researchers were making early discoveries, they had a way to bypass a traditionally longer review and publication process to give hope, share building blocks, and encourage collaboration.

At the beginning of April (2020) we began a conversation with editors of journals including *TechTrends* (Chuck Hodges) and the *Journal of Computing in Higher Education* (Stephanie Moore). We knew three things. First, we knew that many education and technology journals would probably invite and publish special issues of articles in 9-24 months. These articles would be retrospectives detailing what happened, what was implemented, and what worked (or did not work). Second, we knew that COVID-19 would probably last a while, and that although future journal articles would be tremendously helpful, we needed to publish work that would immediately impact people. Although 'emergency instruction' was getting people through their spring classes, there was a very high likelihood that they were going to need support and advice in the summer and into the fall (and perhaps beyond). Thus, in addition to support in the next 24 months, they needed help right away.

Third, we knew that there were a lot of success stories happening in teacher education around the world. We each personally heard and saw stories of success in responding to the pandemic and emergency online instruction at the preservice teacher education and the inservice teacher professional development levels. However, these 'stories' were not your typical research narratives. In other words, these were not stories that began with a theoretical idea, developed into a research plan, received human subjects research approval, resulted in collected and analyzed data, and then were going to be turned into 30-page academic papers. Rather, these were stories of heroes using technology to respond to desperate situations. We needed to share these stories as a way of providing hope, support, and ideas for others while maintaining the rigor of the academic review process.

We spoke with leaders at both the *Association for the Advancement of Computing in Education* (AACE) and the *Society of Information Technology and Teacher Education* (SITE). More specifically, we sought and were given approval to host a special issue of the *Journal of Technology and Teacher Education* (JTATE) on "Preservice and Inservice Professional Development during the COVID-19 Pandemic." Unlike a traditional special issue, where five to seven articles of 5,000-7,000 words (each) are published, we asked authors to submit short articles of between 500-1000 words. The timeline was absurd for most traditional journals. We released the call on April 15, 2020. We gave authors until April 30 to submit papers, reviewers one week to review papers, and accepted authors around a week to return revisions.

There was initial concern that such a timeline would not work but we were hopeful that we would receive 15-20 articles. The response exceeded our expectations by far; by the end of the night on April 30, we had received 266 submissions. Of those, 33 were accepted for publication in the special issue. By quantity, and by quality of the responses, the special issue idea was a success. The use of a short 'medical model' for publishing allowed us to issue a call for papers on April 15, 2020, and subsequently publish 33 articles in a special issue six weeks later (June 1, 2020; https://www.learntechlib.org/j/JTATE/v/28/n/2/; see Hartshorne et al., 2020).

We took a lot of pride in the journal special issue and what our authors were able to contribute to the field in such a short amount of time. However, we quickly realized we had a major challenge in front of us. With only 33 articles accepted for the special issue, we had another 233 submissions remaining. Some of the 233 submissions were not suitable for publication in response to the call; they were either not about work during the pandemic or not focused at the intersection of technology and teacher education. On the other hand, a large portion of the remaining submissions contained very thoughtful and helpful prose. While they did not necessarily all have an empirical nature to them, they were full of positive news and provided helpful advice and implications for scholars and educators alike. We returned to AACE and asked if they would be willing to let us publish an eBook, providing an outlet for those authors to share their important work with the larger community. They readily agreed, and we had the genesis of this book.

In addition to the original reviews we received from members of the editorial board and ad-hoc reviewers, we began the process of re-reviewing the remaining articles as editors. We identified 156 submissions that we believed had promise

to both enlighten and guide preservice teacher educators and those who lead inservice teacher professional development. We invited those authors to revise their submissions, using a new chapter template to ensure consistency (see *General Outline of the Chapters* below). We provided authors one week to revise and resubmit their work. Resubmitted papers were reviewed again editorially and 133 papers of the initial 266 submissions were accepted for publication in this book.

The General Outline of Chapters

We gave the authors of the special issue a more research-oriented outline for their articles. However, we knew that many of the book chapters did not have a traditional research framework. We also knew that with 133 chapters and 1000-1500 words we allowed book authors, we needed to have consistency for our readers. Finally, and perhaps most importantly, we knew we wanted to help our readers in their daily practice. Thus, we created a template that focused more on the pedagogical innovation (i.e., the response to the pandemic) and its implications for practice.

We asked authors to ensure that each chapter included the following (although some also choose to use sub headers):

- **Front Material** – Title and author information as well as an abstract (75-150 words) and 7-10 keywords.

- **Introduction** (~100-150 words). The introduction set the stage for the work. We told authors that most readers would understand the context of the pandemic, and thus to focus instead on the theoretical framework and literature guiding their work. We also asked them to describe the audience they worked with (e.g., preservice or inservice) and the research and practice gaps they were trying to fill. We told them to think of this as the combined sections of an introduction and literature review of a 'normal' academic paper.

- **Innovation** (~300-350 words). We told the authors that this was the first of two especially important sections. We reminded them that if the purpose of the chapter was to help others, then someone reading this section should be able to clearly understand what they did during the pandemic. We encouraged the authors to include links, tables, figures, and appendices—materials that might help others not only visualize but also replicate what the authors were able to accomplish. Authors were advised to ensure that references were used throughout the chapter, but particularly in this section to support and justify design decisions. Some authors also included free-to-use linked media and resources that you will see throughout the book.

- **Results** (~100-200 words). This section was purposely kept short as we knew that most papers were not empirical in nature. Authors were instructed to include data results if they had them and also to consider including literature and references to support early claims and findings.

- **Implications** (~350-500 words). The authors were told that this was the second critically important part of the chapter. We asked them to include straightforward and practical implications for their audience (preservice teacher educators and/or inservice professional development). While the innovations section described what the authors did in vivid detail, this section was intended to be a place for authors to give advice to others based on what they learned. Once again, authors were reminded to include links, tables, figures, or appendices to support recommendations and the implementation by others. We also suggested that this was another great place for references to support those policy and practice implications, particularly if their data were limited.

- **Future Research** (~100-150 words). The implications section provided next steps for readers; it served as a lessons-learned/practical advice section of the chapter (with the occasional policy recommendation). However, we also wanted authors to invite readers into a research conversation. Because many of these studies were pilot studies, we asked that this section be comprised of future research possibilities for both the authors and their readers, particularly drawing literature back in from the introduction.

- **References**. There was no maximum number of references, and they did not count against the word limit (neither did figures, images, links, or appendices). However, we reminded authors that references should be placed throughout each of the sections, not just in the introduction.

- **Appendices**. We really wanted this book to be useful to readers attempting to teach online or in blended environments for summer, fall, and beyond. As such, we encouraged authors to include any materials that would allow readers to immediately and directly implement the authors' work into their own practice.

The Sections of the Book

At its core, this book is focused at the intersection of technology and teacher education. However, even with such a specific focus, authors submitted papers that covered very diverse areas of inquiry or practice. We divided the book into seven categories that somewhat mirrored the categorical divisions for the special issue of JTATE:

1. Online Pedagogical Strategies. The move to remote instruction necessitated the transition from face-to-face or brick-and-mortar approaches to new pedagogical strategies in preservice and inservice teacher education that capitalized on the affordances of technology. This section features 24 manuscripts that discuss a wide range of online strategies that facilitated the delivery of teacher education activities. Articles in this section discuss theoretical frameworks that support the adaptation of face-to-face teaching and learning strategies to online platforms, new forms of teacher lesson planning for online teaching, the development of digital resources for teachers that supported online teaching and learning, and strategies for teachers as they prepare parents and students for online learning and assessment.

2. Community and Collaboration. The COVID-19 pandemic made it clear that close collaboration with school systems and institutions of higher education, both locally and globally, was going to be essential to respond to the needs of preservice and inservice teachers. The 19 chapters featured in this section highlight ways to build such communities. These chapters discuss webinars for teachers worldwide during the pandemic, teacher and teacher educator discipline-specific as well cross-discipline communities of practice, the development of school/university partnerships to support the transition to remote teaching, the role of home-school connections, and the promises of social media to empower and connect educators.

3. Alternative Field Experiences in Preservice Teacher Education. Clinical field experience is the hallmark of teacher education and a required component of teacher licensure (Darling-Hammond, 2014). With the need to shift both university and K-12 school instruction online, teacher educators had to quickly re-envision and re-imagine traditional field experiences, which typically place preservice teachers in physical classrooms working alongside inservice educators. The 19 chapters featured in this section discuss innovative approaches to preservice teachers' field experiences. These chapters discuss virtual internships, the use of simulations and video as an alternative to field placement, unique ways of facilitating preservice and inservice collaboration, and alternative approaches to helping preservice teachers connect theory to practice, a primary goal of field experiences.

4. Preservice Teacher Education Methods and Pedagogy. Like field experiences, content-specific methods courses are an essential component of teacher education (Darling-Hammond, 2014). These courses focus on helping preservice teachers develop knowledge and skills needed to teach within a discipline. The 15 chapters featured in this section discuss new pedagogical approaches to the delivery of methods coursework (e.g., mathematics, music, language education, and educational technology), as well as innovative pedagogical strategies for helping preservice teachers develop critical skills related to reflection, collaboration, and ongoing learning.

5. K-16 Educator Professional Development. Professional development is essential for helping teachers keep up to date with new developments in theory and practice. This need was exacerbated during the COVID-19 pandemic as educators had to shift quickly to remote instruction. This section includes 16 chapters focusing on innovative approaches to educator professional development in both K-12 and higher education settings. These approaches leveraged what we know about effective professional development, including opportunities for personalized and just-in time learning to coaching and tutoring.

6. <u>Digital Tools</u>. In the current technology-saturated world, the plethora of digital tools can sometimes be intimidating, resulting in their misuse. When preservice and inservice teachers were suddenly faced with the necessity of transitioning to online instruction, they needed guidance with how to use digital tools in pedagogically-sound ways. This section features 23 chapters that overview innovative implementations of digital tools. The authors discuss how online instruction can be facilitated and enhanced using digital tools such as audio feedback, hyperlinked websites, 360-degree video, videoconferencing, storyboards, and digital storytelling.

7. <u>Equity Issues</u>. When instruction precipitously needed to be delivered electronically, preexisting concerns regarding equity issues in education became increasingly amplified. The 13 chapters featured in this section cover a variety of topics addressing these equity issues with the goal to help preservice and inservice teachers meet the diverse needs of all learners. Topics addressed include discussions related to the digital divide, the technocentrism trap, assistive technology solutions, and wellbeing.

Conclusion

Our academic publication process of peer reviewing manuscripts is a good example of a tried-and-true practice that is common in academic traditions. As academics, we strongly believe in and continue to promote full peer review, just like we did in this book. However, through the special issue and this book, we adopted a fast 'medical model' of going from a 'request for papers' to publication of a special issue in about six weeks and to a book in about eight weeks. This was truly an experiment for us as editors and for many in the field who were writing for us, reviewing for us, or just watching what we were doing. We believe that this accelerated model has merit and should be considered for future publications. This would be particularly true during events that require immediate response (e.g., a pandemic).

In conclusion, we are pleased to be able to bring you this book on technology and teacher education during (and after) a pandemic. In these pages, you will find thoughtful and well-written chapters that can be used to improve practice, to inform current and future research, and to drive important policy questions.

Respectfully,

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Online Pedagogical Strategies

Remote Coteaching Norms for Teachers of English Learners

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Coteaching English Learners helps them to feel included in the classroom setting and allows them to progress their English proficiency alongside their peers. As COVID-19 made the traditional definition of coteaching a near impossibility, many teachers adapted to remote coteaching. This chapter highlights how one district used coteaching norms to ensure relationships stayed coequal in order to meet the needs of all students. By utilizing a shared virtual space, holding regular consultation meetings, and sharing assignments ahead of time, our coteachers have reported that they feel their coteaching is just as strong as it was in traditional school building.

INTRODUCTION

Within the district where I work, we predominantly utilize a coteaching model for our English Learners (ELs). Cook & Friend (1995) describe coteaching as two or more teachers delivering instruction to a diverse group of students "primarily in a single classroom or physical space" (p. 2). Several scholars have written about the value of coteaching over the past two decades (Cook & Friend, 1995; Gately & Gately, 2001; Dove & Honigsfeld, 2010), yet much of the current literature is focused on traditional classroom coteaching, not on remote instruction. As the COVID-19 pandemic forces our students and teachers out of their buildings and into their homes, coteachers should maintain that they are two teachers delivering instruction to a diverse students who need both sets of their expertise. Our current world situation is illuminating several inequities that students face (ADL, 2020; Burgess & Sieversten, 2020; Woolley, Sattiraju & Mortiz, 2020), and neglecting the purpose behind coteaching can further those inequities. Our school has been working toward embracing three norms for effective remote coteaching: (1) utilize a shared space, (2) hold regular consultation meetings, and (3) share assignments.

INNOVATION

Norms serve as a mini contract between two teachers to help maintain boundaries and expectations. If your coteaching partnership did not have pre-established norms before moving to a remote coteaching model, it is not too late to establish some.

Utilize a Shared Virtual Space

One norm that all of our coteaching pairs have is that both teachers need to be active in their Google Classroom space, but they are given the autonomy to establish further norms on what that looks like. Here are some of the norms that our teachers have implemented:
- one teacher posts daily reminders while the other posts the weekly assignments
- both teachers give feedback to half of the class by Sunday night
- teachers take turns hosting Google Meet lessons (some use Zoom in order to have two hosts)

Regular Consultation Meetings

Another norm that is imposed by the district is that coteachers must hold consultation time with each other because it is important to include ongoing communication (Cook & Friend, 2016). However, teachers are given the freedom to establish what their consultation time looks like. Some of our teachers have chosen to coplan on Zoom twice a week for sixty minutes. Others Zoom once for ninety minutes but have ten minute phone calls at the end of each day to discuss student progress and any updates they may need to make to their weekly plan. Determining what works for your schedules is the only way to make a consultation norm work. Some areas our teachers consider when coplanning are:
- What linguistic supports or accommodations are necessary for students?
- What assessments will be used to know students learned the intended objectives?
- What language will students need to access the content?
- Which teacher is delivering each part of the virtual lesson?

A shared consultation agenda or template may assist your coteacher and you in maximizing your time. A sample consultation template for remote teaching can be found at: https://docs.google.com/document/d/1ttSdfUi1C2Bb6TpNW_My-3iv-Wqh2Y_xQ_S5PVM8ZDWA/copy.

Share Assignments

The last imposed norm is for teachers to send all assignments to each other prior to posting on Google Classroom. This is especially important when working with English Learners. A lot of our coteaching pairs include this norm by creating assignments together using a shared Google Doc. By giving each other access to the same document, they can co-develop and add comments to the document on areas where they see a need for linguistic support.

Keep in mind these are merely suggestions; norms will only work if they are agreed upon *and followed* by both teachers.

RESULTS

A survey was sent to coteachers in our district to ask about their remote coteaching experience. When asked about how their norms have changed as a result of COVID-19, over half of respondents said they felt remote-teaching norms were just as important as in-person coteaching norms. When asked about how their consultation time has changed as a result of COVID-19, over half of respondents said they are consulting more frequently. One respondent answered, "Now that we cannot just stop by each other's classrooms, we find ourselves texting and calling each other a lot more. Our interactions are shorter than they were before though." Another respondent mentioned, "We meet more frequently because we can call and FaceTime throughout the week instead of trying to carve minutes out during the day." All of these answers indicate that there is more collaboration happening as a result of remote coteaching because teachers are no longer confined to the strict bell-schedule at school. The teachers' overall impressions on remote coteaching demonstrate that it took a couple of weeks to get into the groove; but, now that we are several weeks in, they are getting more comfortable with remote coteaching.

IMPLICATIONS

There are a few action items that teachers can take and implement right away in order to establish or strengthen their remote coteaching relationships.
1. Establish Norms: While your norms do not need to be based upon the three outlined in this chapter, I do recommend using them as a solid starting point. Other norms you may consider to demonstrate you are coequal partners include (a) always use "we" language, (b) avoid using the terms "your kids" and "my kids", and (c) ensure both of your names are on all assignments and emails.
2. Collaborate: It may seem obvious that coteachers would naturally be forced to collaborate, but it is sometimes a challenge for veteran teachers to open themselves up to new ideas. Likewise, it can be difficult for novice

teachers to not take it personally when offered advice. However, in most coteaching partnerships, one teacher is the expert on the content and one teacher is the expert on language acquisition. Typically, both teachers aren't experts in both fields. Furthermore, as Dove and Honigsfeld point out, "teacher collaboration is not an option" and "for successful coteaching to take place, a multitude of opportunities must also be established" (Dove & Honigsfeld, 2018). I suggest new coteaching pairs attempt to meet at least twice per week. This allows time to discuss the content, the language, the plan, and the assessment including who is taking on which part of the lesson and who is creating what materials for the lesson. By meeting on a regular basis, and having it as one of your norms, teachers will also have the opportunity to reflect on how well their lessons and coteaching partnership are progressing.

3. Try new things: As the COVID-19 pandemic permeates our lives, there are a lot of technological materials being offered. While there are too many resources to try them all, the adage "two heads are better than one" applies. Coteachers can work together to try new learning experiences for their students and provide each other feedback from their particular lens on how well they think the platforms will align with their current student needs. One resource many teachers, myself included, have found to be effective for teaching ELs during this pandemic is Flipgrid. Flipgrid allows your students to submit voice or video recordings to a prompt, question, or video you leave for them. It can easily be incorporated with Google Classroom and allows both coteachers to provide feedback.

FUTURE RESEARCH

Future research on this topic should examine the effectiveness of remote coteaching. While much of my work during COVID-19 has been focused on maintaining relationships between coteachers, it will be beneficial for me to now look into the instruction given by the teachers. Because the outlook of public schools opening in the Fall is still unknown, we need to be sure that remote coteaching is helping students learn. The next step in harnessing a remote coteaching model is to examine the Google Classroom spaces, or other learning platform (Seesaw, Schoology, etc.), of the coteachers. Some questions to consider include:

1. Do students view both teachers as equals in the classroom? Are they asking both teachers for support?
2. Are language supports being used solely for ELs or are coteachers assigning the same assignment to everyone?
3. How are coteachers including all four language domains in their instruction?
4. What is the work quality of students in cotaught classrooms compared to the work quality of the same students in their non-cotaught classrooms?
5. Can coteachers effectively utilize the break-out room feature in Zoom to incorporate different models of coteaching (Cook & Friend, 2016)?
6. How are coteachers communicating with their families? Are they setting up joint conference calls? Who is taking the lead?

With these recommendations, it is important to keep in mind that it will be difficult for coteachers to have effective instruction without following the norms laid out in this chapter: (1) both teachers need to be active in their virtual learning space, (2) teachers need to set-up and hold regular consultation meetings, and (3) teachers need to share assignments with each other prior to passing them along to students. Therefore, district leaders and teachers should work on the trust and relationships with their coteachers before evaluating their effectiveness.

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Engaging Parents Through School-Wide Strategies for Online Instruction

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With the rapid onset of online learning due to the COVID-19 crisis, teachers and schools with little experience in online teaching were tasked to quickly develop and deliver online learning experiences. This created a hodge-podge of approaches in lesson delivery, live class scheduling, and parent-student and student-teacher expectations for communication and student support that quickly became overwhelming for parents to implement in the home. After receiving this feedback from parents, we assisted a school in revisiting their school-wide processes and online learning plan to incorporate parent-centered, school-wide strategies that supported students and parents learning at home together.

INTRODUCTION

Almost immediately after transitioning to online learning at a small, private K-6 elementary school, teachers recognized that developing a list of at-home learning activities for students was not enough. Feedback from parents was clear: they wanted more support to administer online learning with their children at home. Supporting the parents' role meant the school needed to incorporate more scaffolding for families as they transitioned to a new way of teaching and learning. Recognizing their limited experience in the area of online teaching, the school engaged a consultant to provide faculty professional development to create a more robust online learning plan.

The importance of parent engagement in online learning is essential (Borup et al., 2014), and needs to be considered differently than in brick-and-mortar classrooms. When students are learning at home, ideally parents work in tandem with teachers to motivate students, organize and structure the home learning environment, and in some cases act as an instructor to support students' learning (Borup et al., 2014). In cases where parents have multiple students, and students with disabilities, coordination and planning needs to go beyond a single teacher or classroom to involve teachers and specialists, often across schools.

Equipping parents with tools and strategies to create an effective home learning environment is shown to improve student engagement in online learning (Borup et al., 2014). Partnership with parents in the implementation of the learning plan needs to be an important part of a school's planning. As online learning consultants to this school, we incorporated the importance of these ideas to develop more uniform strategies to engage parents as partners in their children's learning.

INNOVATION

To maximize student engagement and support parents in distance learning, a school-wide plan for online instruction centered on supporting both parents and students was developed through a series of meetings between the consultants and school faculty. By examining online instruction from a systems view, not just individual classrooms, the school was able to consider parents with multiple children and students requiring individualized support inside and outside of the

classroom. In these cases, parents needed additional support to create a structured and efficient home learning environment.

Incorporating tools and strategies for parents implementing at-home learning required collaboration within teacher grade level or content area teams, as well as across teams and departments within the school. The school embarked on a series of collaborative sessions across classrooms, grades, and content areas, with the goal of increasing parent engagement in their online learning plan. As a result, the following strategies were implemented to make learning more efficient and accessible for students and parents, and increase parent engagement.

- **Consistent, all-inclusive synchronous meeting schedules.** A master schedule of video-conferencing meetings for each classroom was created, which included times and links to all instructional sessions, including special classes like art or music, and also office hours. Personalized schedules were made for students requiring support services and individualized sessions (see Figure 1).

Teacher	Monday	Tuesday	Wednesday	Thursday	Friday
8- 8:30 am	Ms. D Speech & Language *link*		Ms. D Speech & Language *link*		
8- 9 am		Specials Art *link*	Mrs. B English (office hours) *link*	Mrs. B English (office hours) *link*	Mrs. B English (office hours) *link*
9- 10 am	Mr. C Science *link*		Mr. C S. Studies *link*	Specials Music *link*	
10- 11 am	Mrs. B English *link*	Mrs. B English *link*			
11- 12 pm	Lunch/ Break time	Lunch/ Break time	Lunch/ Break time	Lunch/ Break time	Lunch/ Break time
12- 1 pm		Mr. C Sci/S. Studies (office hours) *link*		Mr. C Sci/S. Studies (office hours) *link*	Mr. C Sci/S. Studies (office hours) *link*
1- 2 pm	Mr A Math *link*				Mr A Math *link*
2- 3 pm	Specials PE *link*	Mr. A Math (office hours) *link*	Mr. A Math (office hours) *link*	Mr. A Math (office hours) *link*	

link refers to the details and/or url needed to enter the video-conferencing meeting.

Figure 1. *Sample Schedule for Student with Multiple Teachers and Individualized Services.*

- **Common adaptable lesson plan format.** A common adaptable lesson plan format was developed for all classes that laid out parts of the lesson with simple, consistent headings customizable to any content area (Figure 2). This strategy sought to support students in managing information and resources, an important component to efficient executive functioning (CAST, 2018).

Discover	• Description of mini-lessons introducing new skills and concepts through video, instructional text, images and/or audio.
Practice	• Short practice questions or interactives for students to practice the concept.
Apply	• 1-3 options for students to choose to apply their new learning.

Figure 2. *Sample Common Lesson Plan Format.*

- **Student-friendly lesson text and formatting.** Teachers reconsidered their lesson writing and focused on writing lesson text to the student, not the parent, even for very young students. Figure 3 shows sample instructional text written to a parent, and the same text reformatted into a more student-friendly, accessible format. Teachers were introduced to principles of good design for eLearning (Shift Disruptive eLearning, December 12, 2018) and readability checkers to support their lesson authoring practice.

Sample Text: Parent Focused	Sample Text: Student Focused
Ask your student to read pages 8-12 and ask your student to write three examples of how the main character's actions affect her family? Be sure your student records the page number they found each example!	Open your book to page 8. Read pages 8-12 then Think about how Lily's actions affected her family. Give 3 examples from the text. Write the page number you found the example on. 1. _____ p. _____ .

Figure 3. *Parent Focused vs Student Focused Instructional Text.*

- **Weekly lesson checklist.** A printable checklist of lessons was created in a common format across classrooms. Figure 4 shows a sample weekly checklist. Checklists are effective organizational aides for monitoring and organizing learning and setting reasonable goals for learning progress (CAST, 2018). They also support students in sequencing the completion of activities by providing choice in the order students choose to work on activities each day, which is also in alignment with strategies in Universal Design for Learning (UDL) guidelines for optimizing engagement in learning (CAST, 2018).

Monday	☐ Reflex Math© practice
	☐ Reading Mysteries! Pages 10-21 and activity
	☐ Draft your poem
	☐ Science video + activity
Tuesday	☐ Math activity 8 OR workbook pages 1-15
	☐ Phonics activity
	☐ Math video + game
	☐ Revise your poem
Wednesday	☐ Reflex Math© practice
	☐ Reading choice + response
	☐ Poem final version + share with class
	☐ Science discovery
Thursday	☐ Math activity 9 OR Math Workbook pgs 17-20
	☐ Reading activity and workbook pgs. 10-13
	☐ Science reflections and drawing
Friday	☐ Reflex Math© practice
	☐ Develop Passion Project Day 1

Figure 4. *Sample Weekly Checklist for a Classroom.*

- **Choice of online and offline options.** Teachers provided choice in learning activities, and offered both online and offline work options, wherever possible in lessons and assignments. Figure 5 displays how an online-only option was upgraded to provide students' choice and flexibility in how they apply their learning. This strategy aligned to UDL principles for increasing student engagement by empowering students to make decisions about their learning and providing them autonomy in the learning process where appropriate (CAST, 2018).

Online Option Only	Online and Offline Application Options with Choice
Complete Math activity 8 in the online platform	• Complete Math activity 8 in the online platform • **OR**, complete the Math activity on pages 10-13 in your workbook • **OR**, use the video making checklist and slide deck to create a 1-2 min video teaching the concept in your own words to the class.

Figure 5. *Online and Offline Options with Choice.*

RESULTS

Through the implementation of the online learning plan, two principles were clear. First, supporting parents in motivating students and managing the organization of the learning environment meant a school-wide approach was needed so strategies could be implemented consistently across classrooms. We know using external scaffolds and aids, such as check-lists, schedules, and consistent visual formats can maximize the effectiveness and efficiency of the learning experi-

ence (Wilson & Conyers, 2016). Implementing these ideas with families in mind bridged what we know about effective student learning and put these tools in parents' hands.

Second, we cannot fit all students and families into a single idea of online learning. When home learning environments are considered, flexibility becomes even more important. We learned that maintaining rigor is important, but teachers also need to provide options for learning activities that work best for students and families. Choice provides students with a sense of autonomy and ownership in their learning, thereby increasing engagement (Anderson, 2016), making it easier for parents to implement the learning plan.

IMPLICATIONS

After implementing these strategies, we gathered informal feedback from parents and teachers. Parents reported having common templated, personalized schedules, including times and links, reduced confusion, and simplified their efforts in organizing the workday, particularly when siblings or additional services were involved. Therefore, teachers need time to coordinate with teachers across content areas, classrooms, and specialties to create a schedule for students in a consistent format providing all the necessary information for easy access.

The common lesson plan format also helped both students and parents understand the flow of the lessons across content areas and classrooms. This strategy organized the learning and helped to chunk information and activities into a reliable workflow to support student engagement (CAST, 2018). To incorporate this strategy, teachers should work collaboratively to create a common lesson plan format that will not only help parents but will also help teachers share lesson writing responsibilities as they can build upon other's ideas more easily.

Refocusing teachers' authoring of lessons using student-friendly text and formatting ensures lessons are more accessible to students (CAST, 2018). Parents reported this made it easier to assist their students and students could independently read and complete lessons on their own, requiring less parent intervention. This suggests teachers should incorporate tools such as readability checkers (available online or in Microsoft Word©) and visual reminders as they write lessons that are easily understood by students.

Parents reported the weekly checklist was used frequently to check-in with students and gauge what has been accomplished, allowing oversight while also supporting students to work independently. Having the same type of checklist for each child also helped parents establish clear routines and expectations for everyone. Checklists can also help sustain effort and persistence by making daily goals and objectives visible (CAST, 2018). Therefore, we suggest teachers add checklists to their classroom routine to support students' independence, while also engaging parents in monitoring learning progress, a critical aspect in online learning (Borup et al., 2014).

Finally, providing online and offline learning options and assignment choices improved student engagement, provided parent flexibility in helping to structure students' time on/off devices, and allowed for the rotation of devices in families where one device is shared between students. However, generating multiple methods for students to learn and demonstrate mastery can increase a teacher's workload considerably. Therefore, collaborating with other teachers to develop shared lesson plans with a variety of alternatives to explore concepts or demonstrate learning is also suggested.

FUTURE RESEARCH

Parents play a significant role in the success of students learning at home (Borup et al., 2013; 2014), thus closely considering their role in online learning plans is essential. Employing parent-centered strategies helps parents create a more organized, engaging, and efficient home learning environment where students focus on learning, and parents focus on supporting the learning process. Although these strategies could be replicated in a number of different contexts to increase student success through parent engagement, the school will continuously evaluate the online learning plan through periodic surveys to evaluate the effectiveness of these strategies, asking specific questions to gauge parent and student engagement and satisfaction and offering frequent opportunities for parents, students, and teachers to suggest improvements.

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What Are Artists and Art Educators Teaching Us About How We Can Conceive and Deliver Teacher Professional Learning Into the Future?

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Artists and art educators have an aptitude for nimble, responsive and adaptive thinking borne from extensive experiences of traversing crises; be it through enduring significant cuts to funding, marginalization in cultural and curriculum agendas and – consequently - having to reinvent where, when and how they engage in their practice. In looking at the ways in which artists and art educators have weathered such challenges, a masterclass in professional reinvention and transformation emerges. In consideration of this, what insights can be drawn from the practices of artists and arts educators in Australia to inform how we conceive and deliver global teacher professional learning into the future?

Keywords: art education; professional learning; practice; teacher education; artists; art educators, a/r/tography.

INTRODUCTION

In Australia, the Arts and education sectors respectively are navigating unprecedented challenges for how to engage in and sustain practice in the pandemic (An open letter from Australia's arts industry, 2020). Prior to COVID-19 many were already innovating embodied and participatory practices in line with social, cultural and educational changes (InSEA, 2018; Wright & Coleman, 2019). While this crisis created a sudden and unanticipated pivoting for teachers through digital technologies, it has for others expedited, consolidated and affirmed post-digital ways of making and responding to art. These responsive shifts borne of crises exemplify artists' and art educators' nous for splicing physical and digital contexts to enable successive teaching of art education. Artists and arts educators have much to contribute to how teacher professional learning can create circumstances conducive for teachers to challenge, improvise and hybridize, redefine boundaries and break routines (MacDonald, Hunter, Ewing, & Polley, 2018). This chapter articulates the gaps we found between practice and pedagogy for better understanding how art teachers hybridize their practices and pedagogies to enable slipperiness and slippage (Deleuze & Guatarri, 1988) for teaching and learning in and beyond a crisis.

INNOVATION

This project was designed as a speculative a/r/tography; an innovative, speculative practice-related method that invites a participatory response through its design; it is through finding slipperiness and slippage that it locates a site to thrive. As a relational methodology it allows for connections and collaborations to create pedagogical interventions from the human, non-human and more-than-human places we find ourselves in (Coleman, 2018; MacDonald, 2012). It is from within this gap that we are coming to understand how process, product and creative practice are nurtured through embracing not knowing, endurance, survival, resilience, and risk (Dow, 2020).

As a speculative-possibilities project, it begins within our roles in art teacher education. Our provocation and invitation to *practice as research* through collaboration had other art educators also responding quickly to the need for creative and critical engagement opportunities for students' visual art learning at home; catering for online, offline and off device needs (Art Education Australia, 2020; InSEA, 2020; TATA, 2020). The collective implications and our response to this global pandemic have reminded us that complex societal problems will not likely be solved through singular disciplines or priorities (MacDonald & Brown, 2019).

Being an insider also opened space to co-design learning and teaching opportunities with pre-service art teachers. Shifting to an active inquiry-oriented and collaborative research lens that embraced digital literacies brought a sense of true to context purpose and reassurance for those looking to enter the field. Given the contextual and circumstantial precarity created by COVID19, coupled with an emphasised need for teachers' to be able to employ transferable capacities, this shift of relational dynamic for teaching and learning is both necessary and messy (Budge, Lemon, & McPherson, 2016) for the initial teacher education context. However, as artists who are entrepreneurial and agile (Bridgstock, 2013), they bring a preparedness to exercise these attributes, and a readiness to shift into new ways for driving innovations in studio-based pedagogies in art education. At the Melbourne Graduate School of Education, the Visual Arts program embraced being online and candidates began to design and curate 'making' and 'responding' learning experiences using TikTok, YouTube and Google Classroom, in turn these candidates have been researching slipperiness and slippage in practice for teaching and learning art, in and beyond the crisis. At the University of Tasmania, the MTeach Arts Specialisation was already being delivered fully online prior to COVID19. The slippages that unfolded from the teaching/learning intersect in this context were simultaneously bound by and opened through a collision of individual and collective experience of crisis. Online encounter during this time gifted a renewed depth of insight into, and appreciation for how, when and where relationships can be enriched in and through digital encounter to cultivate kindness, understanding and rapport. In the context of attending to relationship in the online initial Arts teacher education space, digital technologies can powerfully underscore how we make sense of shifts and slippage as a threshold for change.

RESULTS

Writing results in a speculative a/r/tographic inquiry is troublesome, as this work continues to be mapped and traversed through ongoing practice. The slippage needs be interrogated further, more adventures recorded, and possibilities explored. We can, however, discuss the (im)possibilities found within the ethos of an a/r/tographic inquiry; resisting findings and preferring to follow emergences and openings in data as nimble, responsive, agile, adaptive and relational researchers. Found within the possibilities of a global pandemic we have developed a new Collaboratory in this inquiry, developing a connection as insiders within the cultures we have been exploring and will further through the implications for professional learning that have emerged. These results may seem unorthodox, as they indicate opportunities for learning, unlearning and (re)imagination as the crisis unfolds.

Our results are contingent upon our capacity to reinvent what we do in our practice, where we do it, how we do it and why we do it. What we have learned from our experience as insiders in this moment in time is akin to what our artist and art teacher colleagues are finding as they traverse new paths and new opportunities: that artists and pre- and in-service art teachers must be afforded opportunities to enable slipperiness and slippage in their practice to ideate, create, reflect and innovate without fear of criticism and punishment (Harris & de Bruin, 2017). These results have implications for art schools, initial teacher education and professional learning. When artists and art teachers are provided space to explore, and engage in debate and discourse as practitioners, they are given means and permission to reimagine, rethink and reinvent beyond the (im)possibilities.

IMPLICATIONS

This speculative research emerges from spaces between the aforementioned examples of research and a desire to render, look to and learn from the ways in which the arts and education sectors are navigating this situation. Through our practices, we are coming to know that the phenomena we find ourselves in ought to be captured, observed and acted upon from the inside, because we too feel the risks and consequences of the biggest crisis (Coggin, 2020) in the arts in Australia in our lifetimes. When art teachers are supported to engage in a professional learning community of inquiry that intentionally employs arts' sensibilities, practices and processes, they are equipped with a suite of established and emerging capabilities to reimagine how, and what they teach (Coleman & Selkrig, 2020; Healy & Coleman, 2019; MacDonald, Wise, Riggall, & Brown, 2019; Watkins, Grant, Coleman, & Meager, 2019). Specific implications for art educator professional learning that has emerged from our a/r/tographic inquiry include:

1. Ascertaining how relational art, research and teaching practices are being enacted by pre- and in-service teachers in Australia to enable opportunities for slippage between teaching, learning and assessment contexts.

2. Articulate how insights obtained from looking into how art educators hybridize art making, teaching and research can be used to inform how we conceive and deliver responsive, innovative and dynamic teacher professional learning going forward.
3. Acknowledge how teacher professional learning that has previously been contingent upon physical access to arts, cultural and educational enrichment public programs can look to the slippages practiced by artists and art educators to reimagine how teachers participate in professional learning beyond the complexities of circumstance.
4. Design and deliver professional learning collaborations underpinned by artist and art teacher ingenuity, resilience and adaptability for negotiating hybrid spaces and practices that can enable new hybridized pedagogies to emerge.

This crisis has shown us that when art communities share, collaborate and practice through ways of being, knowing and doing, they are able to reinvent and transform their practices collaboratively (ArtsHub, 2020). Artists' capacities for synthesizing diverse forms of knowledge is underpinned by a propensity for *leaning into* practice and embracing challenge as opportunities to innovate. It is important for future research to map the journeys undertaken from here in order to alight potential professional learning pathways for others *through* practice. Maps or travelogues of how challenges are negotiated in teacher professional learning during the pandemic will be necessary to educate others about the interesting places travelled to (Baguley, Kerby, MacDonald, & Cruickshank, 2020).

FUTURE RESEARCH

The rationale for examining how hybridization evolves in this crisis reflects a way of thinking about practice and pedagogy that is contingent upon being disrupted (MacDonald, Hunter, Wise, & Fraser, 2019). A rationale for slippage as a theoretical framework for enabling transcendence of contexts for teaching and learning and brokering relationality for teacher professional learning has been afforded in this crisis. Future directions for researchers might include looking to the methods of practitioners and scholars in the field of artist and teacher professional identity and practice to understand how they anticipate and adapt to shifting agendas and create space for unplanned outcomes to emerge (Coleman & MacDonald, 2020). Speculative research that explores how creative and critical practice provides architectures for professional learning that enable spaces of play, making, iteration and reflection is essential for scaffolding the process of change and transformation.

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Playing with Faculty: Creating a Learning Management "Sandbox"

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This chapter describes how a college of education in the western United States created a learning management system "sandbox" space to host a community of practice for field supervisor and foundations faculty transitioning from face-to-face to online teaching. Technological pedagogical content knowledge and identity/efficacy professional contexts of faculty were key considerations in the design of the (a)synchronous space. A series of synchronous "playdates" were held to provide collaborative learning, practicing, and sharing practices do develop faculty skills in modeling educational technologies. Initial results indicate that field supervisors with low levels of technological confidence were the most consistent participants. Design elements of the sandbox and playdates, as well as recommendations for replication will be presented in this chapter.

Keywords: Technological pedagogical content knowledge, community of practice, field supervision, online teaching, learning design, collaboration, professional identity, self-efficacy

INTRODUCTION

A recent study proposed that higher education faculty adoption of learning management systems (LMS) is dependent on how faculty feel about changes caused by technology and the educational climate (Liu & Geertshuis, 2019). Research demonstrates that professor modeling of pedagogies in technology use is essential to pre-service teachers learning to teach with technologies (Tondeur, et al., 2012), including using LMS. This chapter presents how a teacher education department, with a limited history of online and blended learning, found a way to develop faculty self-efficacy in technological pedagogical content knowledge (TPACK; Koehler & Mishra, 2009) to support professional, effective modeling of technology for pre-service instruction. Meeting the needs of diverse faculty was a challenge, as some were confident in technological knowledge (TK) of how to use various tools, but needed to discuss modeling pedagogies in using the tools (TPK). Others had strong pedagogical content knowledge (PCK) for teaching and learning, but needed support in developing their TK. It was decided that an LMS semi-structured (Ervin-Kassab & Drouin, 2020) community of practice (CoP; Wenger- Trayner & Wenger-Trayner, 2015) "sandbox" with open "play" spaces and asynchronous, "just-in-time" structured activities, would provide opportunities to develop teacher educators' skills (Stark & Smith, 2016) in teaching with technology, while respecting and attending to their voice (Golden, 2016) as well as professional and technological identity contexts (Foulger, et. al, 2016; Porras-Hernandez & Salinas-Amescua, 2013; Rosenberg & Koehler, 2015).

INNOVATION

The term "sandbox" in industry refers to an environment for testing and evaluating software without breaking any other parts of a system. (Frydenberg, 2013. p.50)

Previous teacher education department surveys indicated faculty, especially field supervisors, felt they had low confidence in using and modeling educational technology for pre-service teachers' learning. The idea of creating a "sandbox" space occurred in a final pre-shelter-in-place technology workshop. Faculty members wanted a safe space to practice, explore, and collaborate with LMS technology tools prior to bringing their instruction online. The "sandbox" was strategically designed to provide faculty resources, community, and space to "play" with the tools embedded in the management system while developing specific TPACK (Koehler & Mishra, 2009) as seen in Table 1.

Table 1

Design Elements of the "Sandbox" Aligned with TPACK

Technological Pedagogical Content Knowledge (TPACK)	Sandbox Design
Technological Knowledge	• "Playdates" held through virtual conferencing • Modules on how to use LMS tools • Screen capture how-to videos
Pedagogical Knowledge	• Conversations in "playdates" • Links to readings and resources in modules
Technological Pedagogical Knowledge	• Embedded connections to learning theory in videos • Hands-on practice and conversation in "playdates"
Technological Pedagogical Content Knowledge	• Space for content-alike groups to discuss and try tools • Peer problem-solving in "playdates" • Wiki space (Pages)
Context	• Growth and learning mindset in "playdates" • Schedule "playdates" at different times • Discussion board and email spaces for community-building and voice

A course shell was created in the LMS as the "sandbox" space, and invitations were emailed to all faculty and staff in the college of education describing and inviting participation. These development efforts occurred directly before the scheduled university spring break. As faculty were added to the LMS shell as "instructors," modules were built based on faculty requests from the workshop. The structure of the space was one in which faculty could play the roles of student or teacher (together) and provide simulated live experiences as they tried out tools. In addition to collaborative space, asynchronous modules consisting of collections of videos, model assignments, and readings were created to provide asynchronous, just-in-time learning opportunities. Examples of module topics and content can be seen in Table 2.

Table 2

Sample Module Topics and Descriptions

Starting a (practice) Course in (LMS)	Requesting and structuring a teacher-education focused course in our learning management system. Thinking about layout of navigation, leveraging modules and assignments for student success. Included links to request forms, tutorials, etc.
What is a "Sandbox?"	Guide to the theory behind and navigation of the "sandbox" space. Reducing cognitive load by "playing" with a technology tool with familiar content before adding new content. Discussion board for questions, ideas, and use of a "sandbox" when introducing students to a new technology.
Using Screen Capture and Presentation Software to Create Instructional Videos	Introduction to the LMS embedded tool for screen capture*. Demonstration with recommendations on how to use the tool to create asynchronous content. Guidance on using the LMS analytics and embedded student engagement tools to support learning.
Flipping Out! FlipGrid and FlipHunts and More!	Use of FlipGrid as a tool for students to utilize in capturing their performances. Discussion and review of performance-based and project-based assessments and rubrics.

* YouTube Channel Content Used in Modules: http://bit.ly/PlaylistsOnlineTeachingKassab

During the scheduled spring break, five modules were built addressing initial participant requests, three open-ended two-hour virtual conferences for co-planning and co-learning were held, and two one-on-one coaching sessions occurred. It was determined that this level of engagement would not be sustainable when classes began again. To meet the need of participants, twice weekly synchronous "playdates" were held on specific participant-generated topics over the next five weeks. "Playdates" consisted of two-hour, drop-in, drop-out, open virtual conferences. During these sessions, participants were able to try out various LMS tools, discuss applications to their own course content, and gain pedagogical ideas for tool use from other participants, as seen in Table 3. In order to meet the scheduling needs of participants, one "playdate" was scheduled for Wednesday mornings, the other for Friday afternoons each week.

Table 3
Sample Playdate Topics and Descriptions

Synchronous Conferencing*	Comparison and "play" opportunities with three conferencing apps: Zoom, Google Meet, and BigBlueButton. Scheduling and inviting students to conferences. Using shared whiteboards, screens, etc.
Strategies for Student Engagement in Conferencing	Use and monitoring of chat, breakout rooms, and writing prompts for synchronous engagement. Inviting students to coteach*.
Considering the Social and Emotional in Online Instruction*	Sharing mindfulness activities with students. Creating social spaces through opening sessions early and holding after-session Q&A. Guiding students in work-life balance during shelter-in-place.
Balancing Cognitive Load: (A)Synchronous Planning and Pacing	Conversations around determining synchronous and asynchronous content/activities. Engagement activities in synchronous teaching. Exploring projects as a structure for flipped online instruction.
Student Grouping and Collaboration	Strategically determining student groups. Proposing collaborative roles and helping students re-think interactions. Using LMS spaces and breakout rooms.

*Open conversations in playdates inspired video content in the YouTube channel.

RESULTS

Synchronous Experiences

During the first week, 14 faculty members asked to join the sandbox, and four participated in both playdates The following week, 10 more faculty joined, four participated in the Wednesday morning and three participated in the Friday afternoon playdates. Over the course of five weeks, 41 faculty joined and utilized the semi-structured and open space as a CoP. Two teacher education field supervisors consistently attended all of the playdates and engaged in 1:1 coaching about technology tools and their particular teaching assignments.

Asynchronous Experiences

An initial analysis of asynchronous activity was completed through the built-in analytics in the LMS. Results indicate that there may be some correlation between the days on which new participants joined the space, new content was added, and page views as seen in Figure 1.
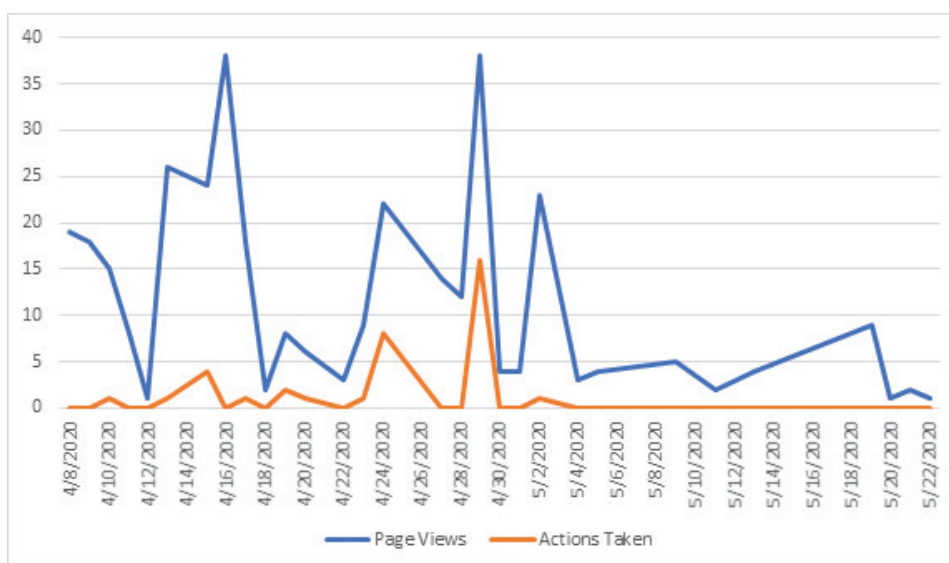
Figure 1. Sandbox Participation and Page Views by Date.

Initial results also indicated heavy usage of the "sandbox" during spring break and the first weeks of online instruction. Attendance at "playdates" followed a similar pattern. By the end of the semester the "playdate" attendance had dwindled to three regular attendees. As participants moved through April and became more comfortable in their online environments, both activity in the "sandbox" and attendance in the "playdates" tapered off. During the final exam week of the semester, participation in both opportunities tapered off completely.

IMPLICATIONS

The "sandbox" was conceptualized as a safe, semi-structured CoP (Ervin-Kassab & Drouin, 2020; Wenger-Trayner & Wenger-Trayner, 2015) for faculty to learn how to use and model educational technology use in their courses to support pre-service teacher learning and skills (Tondeur et al., 2012). The design was grounded in research on effective TPACK professional development (Foulger et. al, 2016) with an emphasis on understanding the context of faculty members' technological identities, self-efficacy, and how these afford or constrain technology use (Liu, & Geertshuis, 2019; Porras-Hernandez, & Salinas-Amescua, 2013; Rosenberg & Koehler, 2015). The most active participants in the sandbox were those who initially and continually described themselves as having very weak technology skills. At the final "playdate," several participants expressed that they had appreciated the opportunities to try things out with familiar technology experts and sympathetic colleagues before using new tools with students. These results indicate that the idea of a sandbox is attractive to faculty with differing levels of technological pedagogical content knowledge.

Design and Development

Initial recommendations for replication in other contexts would be to secure temporal and financial support for familiar, teacher-leaders within a given department or college to lead similar semi- structured CoP (Ervin-Kassab & Drouin, 2020). The timing and preparation of the "sandbox" should allow for both the developer and participants to have time to try things out prior to being live with students. Even a few days prior to the instructional start of a semester or quarter would be helpful for faculty. The initial and ongoing time commitment for the developer/coordinator of the sandbox is also a significant consideration within the research, scholarship, and creative activities necessary for tenure and promotion, as seen in Table 4.

Table 4
Time Commitments for a "Sandbox"

Development Activity	Hours
Promoting and admitting participation	2
Creation and layout of semi-structured course shell	5
Module Creation*	1-2 hours per module
Planning and leading "Playdates"	3 hours per "playdate"

*Includes curation, not creation of YouTube videos

What Worked

Low technology-efficacy participants expressed that they felt very comfortable "playing" with familiar near-peers from the department. They expressed that the experience made them more confident in reaching out to work with technology experts elsewhere in the university. Existing trust, activities to develop online CoP, and providing just-in-time resources and spaces to "play" based on community member requests (Stark & Smith, 2016) were essential to success. Using faculty feedback and collaboration experiences (Golden, 2016) to develop the topics of modules and playdates was challenging, but ultimately was key to participants finding the "sandbox" useful. Having short, concise, TPACK-structured video content to support learning and using LMS tools was also cited as a strength by participants. Having modules that connect practice to theory was cited as helpful.

Areas for Improvement

This summer, the teacher education program will be constructing a semi-structured CoP experience in how to co-teach online for pre-service and in-service mentor teacher pairs. A "sandbox" space will be an essential component of this work. "Playdate" spaces will augment webinar work, and modules will be available for just-in-time learning. In the original "sandbox" there were both wiki spaces (Gullett & Bedi, 2007; Kurt, 2017) and discussion boards (Kebble, 2017) with the intent of facilitating community building and sharing of resources. Neither of these spaces were utilized by teacher educators. Moving into the summer work, strategic grouping, explicit guidance and scaffolding practices in both wikis (Gullett & Bedi, 2007) and semi-structured discussion boards (Kebble, 2017),will more closely reflect research as tools for community and learning. Launching a semi-structured space is a continuous balance between providing requested resources, space for community engagement and support, and overwhelming or overriding the learning experiences participants want to have. A "sandbox" needs regular monitoring, "refilling," and facilitation in order to function as an alternative professional development opportunity.

FUTURE RESEARCH

The idea of a "sandbox" as a learning space for teacher educators, pre-service, and in-service teachers is one that needs greater exploration. Formal research into semi-structured CoP (Ervin-Kassab, 2020; Golden, 2016; Stark & Smith, 2016) in which a mixture of synchronous and asynchronous collaborative learning experiences take place would reinforce or contradict the initial findings from this experience. Alternative professional development approaches, in contrast with a one-size-fits-all one-off traditional approach, is an area in which research would benefit practitioners as well as researchers (Ervin-Kassab, 2017). Additional research with pre-service, in-service, and teacher education faculty participants in "sandboxes" would add insight into how educators' personal, professional, and technological contexts influence the development and enactment of their TPACK (Foulger et. al, 2016; Porras-Hernandez & Salinas-Amescua, 2013; Rosenberg & Koehler, 2015).

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Enhancing Social Learning with Digital Applications: Life Stance Education and Sámi Pedagogy Move to Synchronous Distance Learning in Teacher Education

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This article explores how courses in life stance education and Sámi pedagogy in the primary school teacher education program at the University of Lapland were transferred online mid-session due to the COVID-19 pandemic and how the lecturers (N = 2) and preservice teachers (N = 64) experienced distance learning. The lectures were organized so that the learning expectations were fulfilled, hence, the chosen applications supported interactive and dialogical working methods leading to social learning. The students' feedback was generally positive, and they were pleased that an interactive and dialogical atmosphere could be created with synchronous distance learning. Students also expressed that online learning put them under time pressure, made delimiting tasks more difficult, and induced in them a need for one-on-one supervision. Lecturers need to take these implications into account when planning and conducting online teaching. The process created a two-way-learning place for lecturers and preservice teachers alike.

Keywords: synchronous distance learning, teacher education, preservice teachers, interactive learning, dialogical learning, social learning

INTRODUCTION

In this study, we explore two graduate-level courses in the field of primary school education. The methodology and equipment used in these courses were predicated on their objectives, namely, to provide a pedagogically meaningful and motivating study space and promote a positive, educational atmosphere as well as interactive social connectedness (Keramati et al., 2011; Keskitalo et al., 2019; Raspopovic et al., 2017). We also discuss how we, the lecturers (N = 2) and preservice teachers (N = 64) experienced social learning (see Yan Yu et al., 2010).

The first course concerned life stance education[1] (2 ECTS; European Credit Transfer and Accumulation System), which was originally supposed to take place on campus but was converted into a synchronous distance learning course after three initial four-hour on-campus lectures. The second course concerned Sámi pedagogy (5 ECTS), which blended on-campus and online teaching. As the course started right after the lockdown began, the course plans were modified to follow a synchronous distance learning methodology.

INNOVATION

The courses used *Adobe Connect* conferencing software (adobe.com) for online meetings. It allows large or several small groups to collaborate in an online classroom. However, the platform has been reported to induce some negative feelings among users, such as a sense of isolation and a lack of motivation due to technical problems (Kaufmann & Frisby, 2013). To combat these issues, all group members were given host rights, shown how to use the platform as an instructor, encouraged to join discussions, share their screens to show their ideas and assignments, and engage in dialogue (Maddix, 2013).

In addition, the *Padlet* platform (padlet.com) was selected to organize distance learning group work. Padlet is a real-time, participatory technology that allows all students to voice their opinions and supports collaborative and social learn-

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[1]   Life stance education deals with ethics and worldviews. The course is taught from a non-religious perspective and is aimed at students who do not belong to any specific religious denomination.

ing through interactive debates and discussions (Dewitt et al., 2015). Thus, Padlet provides students opportunities for peer learning as well as self-reflection, since they can give and receive feedback from their peers at all times during class, which also increases learning motivation (Rashid et al., 2019). Before the first meeting, lecturers prepared the Padlet display as follows.

In the life stance education course, the lecturer created columns on the Padlet wall, the first of which contained instructions, slides, and additional information. The rest of the columns were named such that each student had their own to which their individual tasks could be added during the group meetings. At the beginning of the first meeting on Adobe Connect, the students were introduced to Padlet's functions.

In the Sámi pedagogy course, Padlet was used to present and comment on the main study assignment, which was based on a review of the literature and interviews. Since the course was conducted entirely online, the *Flipgrid* online video discussion platform (flipgrid.com) was used during the first meeting so that participants could introduce themselves, get to know each other, and build group dynamics. Flipgrid can create a positive social learning atmosphere between the students by facilitating collaboration (Craig, 2020; Stoszkowski, 2018).

RESULTS

The courses were generally successful in relation to student activeness; however, technical issues posed problems. The sudden switch to online teaching resulted in some technical issues with cameras and microphones. This was largely resolved by communicating via the chat box in the online classroom, although some problems remained. Furthermore, students with technical issues were able to post videos they had filmed with their mobile phones on Padlet. The students jointly reflected upon the process and provided feedback. For the life stance education course, very positive feedback was given (primarily anonymously) on a Padlet wall, but many students emailed the lecturer directly to comment on the course. One student wrote: "The course and its content are well designed and implemented! The topics made me think and were really interesting." Many were surprised that distance learning could be fun, interactive, and dialogical. As for the Sámi pedagogy course, students played an increasingly active role in the lectures and discussions. The feedback indicates the need to help the students to reduce their workloads, as they found it to be excessive at the end of the school year, especially in the context of the pandemic.

IMPLICATIONS

According to Borba and Zulatto (2010), the need to be open to risks and to be pushed beyond our "comfort zone" is emphasized if information and communication technology is required for teaching. Teachers at all levels of education are expected to do preparatory work for their classes, whether in class or online. We have seen that the more an application is used by the lecturer beforehand, the more confident the lecturer is of his/her digital competency with it. Therefore, we recommend some practice with the chosen solutions before online lessons are conducted.

Furthermore, according to our experience, derived from Mishra and Koehler's (2006) framework of TPACK, technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK), lecturers as well as future teachers need to have competency in all areas of TPACK in order to offer a meaningful and motivating learning experience to students with the help of digital technologies. Hence, teachers should prepare their lessons by asking: what is the pedagogical approach that suits this particular topic and context, and what is a meaningful technological solution in this case? This is followed by refreshing one's recollection in all three above mentioned TPACK areas.

Figure 1 presents the combination of applications that produces a dialogical and interactive online learning environment. We have found that a single application is insufficient and one needs several solutions in order to create a dialogical and interactive online learning environment.
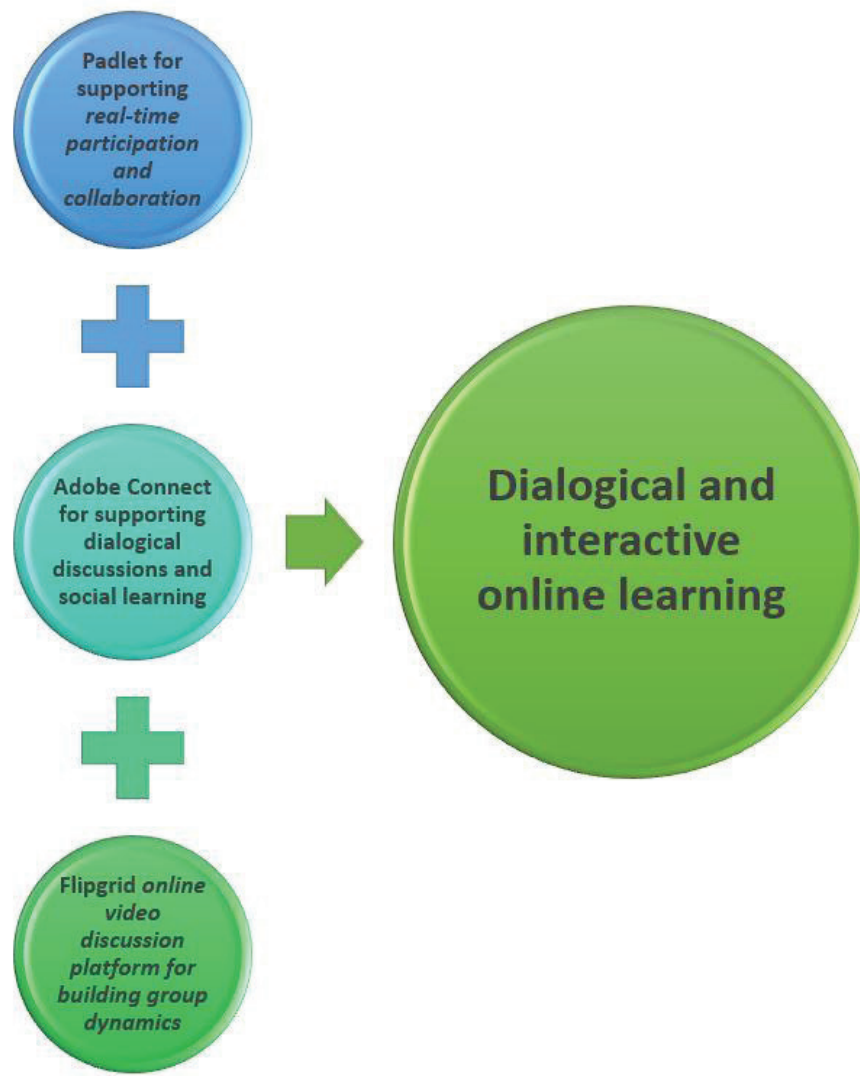
Figure 1. Dialogical and interactive online learning.

As seen in Figure 1, each of the digital applications serves a purpose. Adobe Connect ensures a synchronous conferencing environment that enables collaboration and dialogue (Kaufmann & Frisby, 2013). Simultaneously, Padlet offers a platform for real-time collaboration and interaction (Dewitt et al., 2015; Rashid et al., 2019), and Flipgrip enhances group dynamics and thereby enhances social learning (Craig, 2020; Iona, 2017). Furthermore, according to Chadha and Van Vechten (2017), argumentative interactions lead to deeper engagement in the classes. This combination creates a participatory dialogical learning environment. Hence, we recommend thorough thinking regarding each technological tool's purpose so that the use of the tool is justified.

Preservice teachers need to learn to deliver distance education that connects theory with practice in a meaningful and motivational way (Markauskaite, 2006). The chosen tools (Padlet, Flipgrid, and Adobe Connect) worked well and could be used in a range of educational contexts to support dialogical and interactive learning. In this study, these solutions complemented each other, as none of them could, in isolation, provide a social learning experience with the kind of discussion, interaction, and collaboration that we wanted to provide our students.

Based on the objective to create a dialogical and interactive learning experience, we actively sought the best solutions. In order to find solutions, we recommend knowledge sharing with colleagues and joining social media groups for teachers sharing their experiences. As lecturers, we have been working with educational issues for more than 20 years, and we feel that collaboration and learning new things are essential to lifelong learning.

FUTURE RESEARCH

Online learning demands that lecturers be prepared and competent in the use of different solutions in order to be successful. More research is needed regarding lecturers' TPACK (Management Association, Information Resources, 2018) competencies in order to develop supplementary courses for inservice personnel. In addition, more research is needed on preservice teachers' development of TPACK competencies in order to develop more targeted university courses and secure quality education for all learners in class and online, now and in the future.

The joy of teaching should be shared and knowledge spread (Ellis & Phelps, 2000). We encourage teachers in online teaching contexts to find peer support, as it is important to be able to solve challenges and reduce fear and inconvenience when conducting classes online.

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Creating a Support Network to Sustain Student-Centered, Active Pedagogy in Emergency Online Education

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The University of Wyoming's College of Education (CoE) created a support network to ensure a student-centered response to the transition in learning environments of teacher education courses necessitated by COVID-19. Through establishing a community of support and a consistent presence, the CoE Network promoted continuous professional development that enabled active learning in teacher and leader education courses and practicum experiences. This response yields a developing digital storehouse of support resources and a model of individualized, comprehensive support for active online learning.

INTRODUCTION

In response to the potential move to online instruction necessitated by the COVID-19 pandemic, the University of Wyoming's College of Education rallied its online pedagogical expertise to create an interdisciplinary support network focused on a holistic, student-centered, wraparound approach of continuous professional development (CPD). The University of Wyoming's College of Education includes teacher preparation for numerous PK-12 content areas, concentrations, and special education at the undergraduate level and advanced programs for in-service teachers striving to elevate their knowledge and impact as educators in classrooms, schools, or wider communities in a variety of areas. These teacher education programs all engage with future or current PK-12 educators and account for nearly all programs within the college. The College of Education (CoE) network consisted of faculty, staff, students, and administrators from multiple departments who supported the transition in learning contexts by prioritizing students' needs while emphasizing meaningful online learning that capitalized on the affordances of online tools and active learning pedagogies.

Student-centered support of online instruction (Chen, 2001; Rogers, 1983; Shea, 2005; Kendall, 2006) through a community network draws from literature in behavioral health regarding wraparound services and is complemented by the just-in- time learning prevalent in educational technology literature (Csikszentmihalyi, 2020; Novak, 2011; Wong &

Csikszentmihalyi, 1991). Burns and Goldman (1999) present 10 elements of wraparound services, including individualized and strengths-based, flexible, culturally sensitive, unconditional commitment, and balance of formal and informal resources, which are apparent in the CoE Network approach. Providing wraparound services through continuous professional development (CPD) (Guskey, 2002; Holmes, 2013) increases teacher efficacy for online teaching while building knowledge and technical skills for creating student-centered learning environments. First-time online instructors tend to focus on quantity and manner of content delivery (Conrad, 2004). Other important aspects of online learning like peer-to-peer social interactions or community building are typically neglected, which necessitated the CoE Network's approach and inclusion of social emotional learning (Cleveland-Innes & Campbell, 2012).

INNOVATION

Like much of the educational world, UW responded to learning needs with emergency remote teaching (Hodges et al., 2020), but the CoE Network provided pedagogical support that enabled learning to thrive, at least in part, as meaningful online learning. The CoE Network based support on the unique needs of teacher education faculty and students through a comprehensive, student-centered approach drawing upon the knowledge that support networks are important for tools for promoting accurate and effective instruction (Herman et al, 2019). The CoE Network was created as a preemptive move to support faculty who had never taught online but were faced with the transition; however the network quickly evolved to be a collaborator with UW's Ellbogen Center for Teaching and Learning (ECTL) (http://www.uwyo.edu/ctl/), which served as a hub of outreach for university-wide instruction. CoE administrators deployed a survey (https://tinyurl.com/UWsurveyOLT) and used the results to identify teacher educators' needs to support student learning and tackle the challenge of practicum and student teaching in non-traditional K-12 environments. Identified needs were for knowledge of a variety of instructional strategies and skills related to implementing those strategies within the learning management system (LMS) infrastructure. The CoE Network was created as a community of support to increase collaborative sharing of pedagogical knowledge and establish a continuous presence in response to in-the-moment needs of teacher education faculty and students. In order to effectively drive the technology enhanced learning practices designed and supported by the CoE Network faculty members with high levels of pedagogical achievement were recruited to be mentors within the CoE Network (Viberg et al, 2019).

Community of Support

Building an effective community of support (Lave & Wenger, 1991/2017) meant leveraging the time and effort of an interdisciplinary cadre of individuals. CoE administration focused on matching faculty needing help with mentors' strengths. The CoE Network provided open access forums, one-on-one consultations, and Zoom (https://zoom.us/) open office hours. Network mentors sent out whimsical videos that tackled the uncertainties of the situation and provided emotional and instructional support to the community. Through the ECTL, their staff and the network mentors offered virtual workshops, course walk-through opportunities, one-on-one consultations, and email support. (https://www.uwyo.edu/ctl/idt) The approach was relaxed and supportive, which promoted ideas about online learning, and much needed social-emotional support and community.

Continuous Presence

The CoE Network established a constant presence of support for education faculty and students as the semester progressed. Digital newsletters responded to survey findings and patterns in individual faculty-mentor consultations. Newsletters included activities and resources to support faculty members in creating engaging, student-centered online learning environments and skill building to increase interaction within the LMS. Resources included videos demonstrating the student perspective, how-to scaffolding videos for students to engage in activities, descriptions and links to outside articles substantiating said activities or resources. Newsletters established an always-available resource and presence of support.

RESULTS

Anecdotal feedback demonstrates a feeling of persistence of learning, but with evolving modifications. The CoE on-line teaching survey results, presented in Table 1, indicated professional development needs centered on how to use the LMS and present content effectively.

Table 1
Faculty Interest in Professional Development

Rank	Description	Number of Times Chosen
1	How to maximize use of LMS for online instruction	19
2	Best practices in online instruction	18
3	How to engage students in online learning	17
4	How to maximize tools within LMS	13
4	Best practices in online assessment	13
4	How to create an online learning community in my classroom	13
4	Sharing best practices among faculty	13
5	How to maximize use of LMS for blended instruction	11
5	Advanced LMS tools/capabilities	11
6	How to maximize use of LMS for face-to-face instruction	9
6	Compliance, accessibility, and usability in online instruction and materials	9
7	Resources that are available to help develop an online course	6
8	Other	2
9	LMS basics	1

Note: Response rate was 33/55 (60%); Faculty members in the UW College of Education participated in this survey.

Consultations initially focused on the mechanics of the LMS, but as faculty became more comfortable with virtual teaching, topics focused on engaging students, establishing a presence, and differentiating or modifying assignments to meet students' needs. Table 2 presents common topics of consultations.

Table 2
One-on-one Consultation Topics

Description	Category
Creating and sharing video lectures	Modifying content
Managing students in online course	Presence/Environment
Engaging students with asynchronous discussions	Student Engagement
Online course tours	Presence/Environment
Establishing a sense of community	Presence/Environment
Ideas for increasing student engagement online	Student Engagement
Engaging students in synchronous discussions	Student Engagement
Using Zoom effectively	LMS/Tool Mechanics
Using quizzes and exams in LMS	LMS/Tool Mechanics

Description	Category
Options for online testing w/o proctors	Modifying content
Using hands-on activities online	Modifying content
Responding to written assignments	Modifying content
Using Speed-grader in LMS	LMS/Tool Mechanics
Adding interactive responses to video lecture	Modifying content
Creating assignments in LMS	LMS/Tool Mechanics
Peer reviewing online	Student Engagement
Group work or student collaboration online	Student Engagement & Presence/Environment

Note: data from self-report logs kept by mentors

Student responses reflect appreciation for flexibility, meaningful learning experiences, and the thoughtfulness of education faculty to take into consideration personal situations balancing work, school, social-emotional, and physical health. The COVID-19 pandemic provided a variety of unique challenges to UW students, many of whom lost jobs and childcare options. Most students live in remote, rural areas, which meant that internet connectivity was also an issue. Creating a student-centered learning environment meant listening to the students and adjusting coursework and expectations to meet student capabilities. In one instance, an instructor wanted to proceed with a previously planned cooperative exam. Flexibility was needed for how and through what technologies students collaborated. In another example, the instructor re-designed a team project to be replaced by an independent critical reflection that explored the work students were doing as educators in the K12 setting through a course content lens because weaving the two, class and work, into one learning experience was meaningful for students.

IMPLICATIONS

Teacher education faculty who never taught online transformed components of their instruction and learned online pedagogy to implement active learning in future teaching. Instructors were at first very focused on how they deliver content. Therefore, initial support focused on course organization (https://youtu.be/IfYlByqcuyk), video recording (https://app.vidgrid.com/view/q0ESpGV4P63n), and communicating with students (https://youtu.be/wUtqlNXRSq4) in the LMS. It was important to attend to these pragmatic instructional needs to establish faculty's comfort in the online space so that they could attend to education students' learning needs. Taking a CPD approach to providing this training enabled the CoE Network to meet faculty where they were and attend to their individual needs for delivering instruction, which aligns with key elements of wrap around services and CPD (Burns & Goldman, 1999, Holmes, 2013). This need has prompted the creation of virtual new student orientation that will give incoming education students experience with the course environment and synchronous and asynchronous learning prior to their first semester. This will provide a seamless transition into the classroom and is designed to support student motivation and persistence.

As the CoE Network continued to engage teacher educators in workshop, consultation, and other CPD opportunities, focus shifted to environment, engagement, and learning experience (Guskey, 2002, Holmes, 2013). The CoE faculty published a special themed newsletter (https://tinyurl.com/CoEnews3) on creating cooperative learning experiences and providing valuable feedback. In collaboration with the data science librarian, a follow-up newsletter focused on expanding data literacy activities (https://tinyurl.com/CoEnews4) in the learning environment. The penultimate newsletter utilized a framework of learning (https://tinyurl.com/CoEnews5) based in educational neuroscience to expand faculty focus to include notions of attention, active engagement, error feedback, and consolidation in their online teaching (Dehaene, 2020). The shift in CPD topic interest indicated that teacher education faculty and students were becoming comfortable with remote learning practices and attention was shifting to pedagogical aspirations focused on student engagement (Martin, 2019) and active learning (Freeman et al, 2014; Lumpkin et al, 2015).

The goals and principles that guided the creation of this CoE Network guide the implementation of the next phase of school district and teacher outreach. The CoE Network provides resources and a model to support teachers' pedagogical development as they move from an emergency response to developing meaningful and engaging online learning.

Like most K-12 systems, Wyoming school districts responded by creating what they termed Adapted Learning Plans (https://edu.wyoming.gov/in-the-classroom/technology/distance-ed/adapted-learning/) that accommodated size, location, rurality, and conductivity of districts. In many instances, state leaders and teachers were the students engaged in the courses supported by the CoE Network. Teacher educators share strategies and resources with their students, who were then able to use the resources in the K12 environment. These interactions were often informal and happened through short email or video consultation. Sometimes, they were formalized into the course instruction. For example, one math teacher reflected that she was able to design interactive, multimodal lessons for her students by applying learning from her university course. She created a visual approach to instruction in the online space that particularly helped her students who struggle with math. (https://tinyurl.com/CoElesson) Planning has begun for more formalized collaboration (Colbry et al., 2014) with the Wyoming Department of Education to support K12 teachers and leaders as well as UW students in transitioning from emergency responses to a sustainable quality of learning.

We have developed a model for transitioning from in-person to online learning that takes a CPD approach to faculty and student needs. We based this model on Keengwe & Kidd's (2010) assertion that instructors transitioning to online teaching must adapt to a new role that includes pedagogical, social, managerial, and technical aspects. The novelty of this umbrella model, as illustrated in Figure 1, and our approach to transitioning to online teaching is the order in which we approached the transition and our intentional focus on wraparound support of the student.
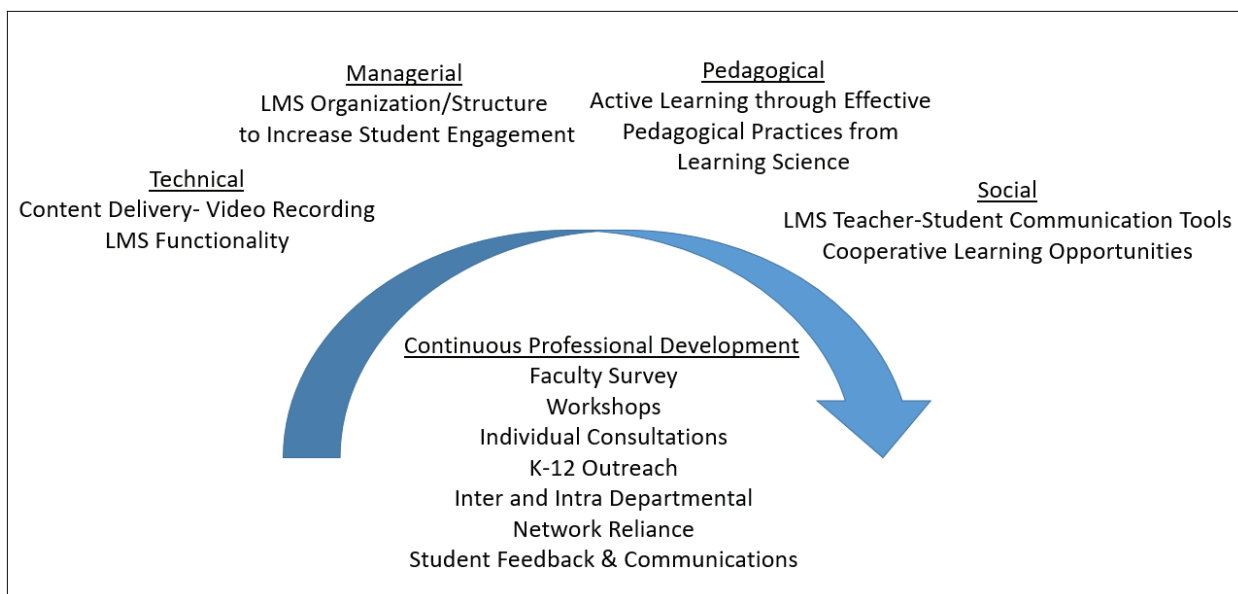
Figure 1. Transitioning to Online Teaching Model.

Taking this intentional approach to transitioning affords replication in future semesters and allows us to assess progress and further our efforts in outreach to the K-12 schools system in Wyoming.

FUTURE RESEARCH

Transitions in educational contexts created by the COVID-19 pandemic prompted UW to create a network that could support CPD of faculty across disciplines. ECTL's continuous support of new faculty mentors prompted mentors creating networks of support for faculty in campus-wide departments. The CoE Network is creating a support site that showcases content from newsletters and individuals in a central, open-access location. Learning modules, webinars, tutorials, and course walkthroughs will be curated to support teacher educators, pre- and in- service teachers, and educational leaders. This hub will serve educators and learners in online-supported learning regardless of future environmental dictates. The support network model can be used or replicated by educators who are interested in individualized, comprehensive, stu-

dent-centered approaches to learning. The anecdotes presented warrant formal inquiry to inform developing communities of learning that value continuous growth as online educators. Future research intends to evaluate the success of support the CoE Network achieved for its stakeholders and explore the practicum experience of preservice teachers.

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À La Carte and On-Demand: Professional Development for Educator Preparation

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As colleges and universities throughout the country moved instruction online in March 2020, a new, ubiquitous problem emerged for educator preparation: the disappearance of classrooms, our main pedagogical and curricular resource. Teacher candidate and faculty participants in EdTech for Teacher Prep (ET4TP), a technology integration professional development program at the SUNY New Paltz School of Education, were prepared to respond to the crisis of moving P-20 instructional activities online in practical, visible ways. This chapter outlines the approach that ET4TP took to professional development in the year prior to COVID-19, and provides suggestions for replication as we grapple with next steps for educating educators during a global pandemic in which in-person, face-to-face classrooms do not exist and the need for online pedagogical theory and practice is more urgent than ever before.

INTRODUCTION

Responding to the federal call to integrate technology in teacher preparation (U.S. Office of Educational Technology, 2017) and drawing on the research on sustained systems of professional development in technology integration for teacher preparation (Kolb, et al., 2018), EdTech for Teacher Prep (ET4TP) takes a just-in-time, to-with-by (Campbell, 2009) approach to professional development for educator preparation. According to the literature, effective professional development for teacher preparation should be sustained over time (Fullan et al., 2006; Taylor et al., 2011; Wei et al., 2009), tailored to the needs of participants (Bostok, 2012; Gabriel, 2010; Plair, 2008; Wright, 2010), collaborative (Hammel, 2007; McConnell et al., 2013), choice-driven (Stover et al., 2011; Ingersoll & Kralisk, 2004), and tool-, platform-, and device-agnostic (Erstad, 2016; Greene, 2018b; Lotherington et al., 2016). Implementation of ET4TP incorporated each of these research-based recommendations, and in doing so, partially prepared participants for the switch to online teaching and learning in spring 2020. This paper lays out the components of ET4TP as it was implemented and provides suggestions for how schools and colleges of teacher preparation might adapt the approach in the time of COVID-19.

INNOVATION

ET4TP provided *on-demand* (when needed) and *à la carte* (as much or as little as necessary) professional development for teacher education faculty and preservice and inservice teacher candidates through 1) a series of edtech workshops; 2) consistent, on-demand, drop-in support sessions; 3) a curated website of easy-to-access, self-paced edtech resources; and 4) a P-20 technology conference. In addition to following a to-with-by approach, ET4TP rooted all learning experiences in the ISTE Standards for Educators (iste.org/standards/for-educators), and proactively taught participants edtech theoretical frameworks, such as TPACK (Koelher & Mishra, 2009), SAMR (Puentedura, 2012), and Triple E (Kolb, 2017). ET4TP participants could take advantage of all components of the program, or they could alternatively pick and choose— à la carte—which offerings would best enhance their practice.

À La Carte Workshops

In spring 2019, the ET4TP team—composed of two undergraduate teacher candidates and a teacher preparation faculty member at SUNY New Paltz—developed a series of lightning-speed, 45-minute workshops on topics ranging from green screens to privacy. All workshops were facilitated by team members, were open to *both* teacher candidates and faculty members, and took place in the Curriculum Materials Center (CMC), a central hub of activity in the School of Education. All workshop materials (see Appendicies A and C) were made publicly available to participants on our website (hawksites.newpaltz.edu/edtech).

On-Demand Support Sessions

Throughout the spring and fall 2019 semesters, the ET4TP team held face-to-face and virtual edtech support sessions for preservice and inservice candidates, as well as for teacher education faculty. Participants either dropped by during set drop-in hours or signed up in advance using a Google Form or Calendly and met in person in the CMC or virtually via video conference. Three team members held sessions at their convenience for no more than 10 hours each per week during each of the spring and fall semesters, respectively.

Curated Website

Built on Hawksites, the university's multi-user installation of WordPress, our edtech website (hawksites.newpaltz.edu/edtech) houses information related to all aspects of ET4TP, including how-to tutorials on topics ranging from Google Suite to iMovie. The website predates ET4TP, and has served as a central information hub since implementation of the initiative.

P-20 Tech Conference

In spring 2019 and in collaboration with the New York State Association for Computers and Technology in Education (New York State's ISTE affiliate), SUNY New Paltz hosted its third P-20 education technology conference in an effort to bridge regional P-12 local school districts and teacher preparation programs in a technology integration context. The gathering provided a professional learning space to try out and build on new ideas for integrating technology in teaching and teacher preparation.

RESULTS

Seventy-seven educators—45 teacher candidates and 32 faculty members—participated across 15 voluntary workshops and 158 hours of drop-in support sessions in 2019. Participant feedback determined that 45 minutes was too short for hands-on, in-person workshops—and that 15 sessions was too many for one semester; therefore, we redesigned a version of the program for the fall 2019 semester—6 'edtech cafés' lasting 75 minutes each (see Appendices A and B).

Our one-day conference, the NYedHub P-20 Tech Conference in May 2019 brought together 200 regional P-20 educators and 30 edtech vendors for a day of professional digital learning (see conference format in Appendix B). The conference further opened lines of communication across the P-20 spectrum, and has since served as a professional learning network for educators in the region. Our website, which has remained the primary ET4TP hub of information, has (according to site analytics at the time of this chapter) seen 668 views in ten weeks since colleges and universities transitioned to remote learning because of COVID-19. By contrast, the website saw only 154 views in the ten weeks preceding the transition, indicating a 433% viewer increase and demonstrating the efficacy of the resource.

IMPLICATIONS

The primary learning from ET4TP is the confirmation that programs like it are a necessary component in the future of teacher preparation (Erstad, 2016; Greene, 2018b). Integrating technology in teacher preparation is no longer a choice, but rather an immediate necessity (Foulger et al., 2019)—especially in the wake of COVID-19. And further, ET4TP points to the need for discussions concerning privacy, data collection, and the Internet of Things—a network that will digitally connect all 'smart' objects, metrics from wearable technology, and other digital datapoints in the near future (Means, 2018).

Discussions of privacy throughout the course of ET4TP programming revealed that few teacher candidates or faculty members truly understand how data travels, how the internet works, how location services reveal more than just a user's location—or what it means for information to be monetized. Therefore, we have to be having parallel but connected conversations in teacher preparation about the underbelly and potential risks of all this innovation (Greene, 2018a; Roberts-Mahoney et al., 2016; Donovan, in press).

So what now? How can the ET4TP approach help in the time of COVID-19? What follows is a possible adaptation of ET4TP as teacher preparation programs prepare for fall.

Workshops

Colleges and schools of education can produce a similar workshop series for the 2020-2021 school year by drawing on the needs and interests of teacher candidates and faculty (McConnell et al., 2013; Donovan et al., 2007). Providing a schedule well in advance helps participants plan ahead, and offering sessions in multiple formats—in person (when possible), hybrid, synchronous online, and asynchronous online—guarantees the farthest reach (Koellner & Jacobs, 2015; Gabriel, 2010). Keeping workshops short (no shorter than 60 minutes) and digestible (no longer than 90 minutes) is advised. (See sample workshop slidedeck format in Appendix C for adaptation.)

Drop-In Sessions

Educator preparation programs can identify tech-savvy student workers to provide ongoing technical support. Programs can do the same, or provide a course release, for tech-savvy faculty members. Together, candidates and faculty can provide on-demand technical support sessions for anyone who needs additional technical support (Gabriel, 2010; Donovan et al., 2007). (See more about videoconferencing tools at tinyurl/videoconfmatrix.)

Website

Any technology integration initiative requires a central, public-facing virtual address (Lieberman & Mace, 2009). Our campus provides WordPress as a platform for building websites, but Google Sites, Moodle, Canvas, Sharepoint, or even Blackboard could provide a digital commons for any school or college of education's technology integration efforts during COVID-19 and beyond. Suggested sections include: about (brief explanation of the initiative), how-to (to house a curated series of tutorials), schedule (for upcoming workshops and/or drop-in sessions), and links to any local or regional edtech organizations or meet-ups.

Conference

Until a vaccine is created and widely distributed for COVID-19, there will be ongoing layers of consideration when planning gatherings for professional learning. Since a multitude of online gatherings are in the process of being planned right now, it may be possible to build on what already exists (Hillary, 2020). But if there are no forthcoming P-20 gatherings for educators in the service of professional development that are relevant to your programs, then carve out space to do so virtually. Reach out to regional educators and leaders and invite districts to send teams, in an effort to connect educators across the P-20 spectrum. You could start with just one meeting or session and build from there.

Implementation & Resources

None of this is possible without additional funding (Darling-Hammond et al., 2017), or at minimum, in this time of frozen budgets and hiring freezes, creative redistribution of funding allocations. ET4TP was made possible by less than $18,000—a $2,200 institutional Research, Scholarship & Creative Activities award and $15,000 TeachNY Implementation Fund grant (suny.edu/teachny/fund). For further context, about half of the total amount was dedicated to student worker and faculty wages; the other half was earmarked for travel to conferences for the ET4TP team. This year, travel will likely cost less.

Whether you take an ET4TP approach or devise your own, schools and colleges of education need to have a plan for support in place as the fall 2020 semester approaches. While faculty development centers provide a tremendous service for campuses, they rarely provide support for teaching teachers how to teach through the ether, much less for conducting clinical practice online. We have been thrust into a rapidly changing world practically overnight and need ample time and resources to prepare so that we can effectively prepare candidates for whatever pedagogical situation is coming next.

FUTURE RESEARCH

Next steps for the ET4TP team include planning and researching the impact of a differentiated online learning institute built to fit the immediate needs of both teacher candidates and teacher preparation faculty who find themselves immersed in an online education world with limited online teaching and learning training. In order to properly plan such an institute, we need to first survey teacher candidates and faculty members about the impact of ET4TP on their practice as educators, educators in training, and teacher educators during COVID-19. Focus groups have already been conducted, and a survey has been disseminated. Additional next steps include seeking further funding to support establishing ET4TP as a permanent fixture in the SUNY New Paltz School of Education. We have so much more to learn in order to effectively prepare teachers for tomorrow, while simultaneously preparing the educators who teach future educators in an online learning context. But what we *do* know is that à la carte and on-demand professional development for technology integration is both possible and necessary in a post-COVID-19 educational landscape.

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APPENDIX A

Suggested Workshop Topics

This is not an exhaustive list of topics, but reflects the workshops implemented by ET4TP in spring and fall 2019. The workshops represent a mixture of theory and practice, and all follow a to-with-by format. See the Appendix C for a slide deck template.

App Smackdown: Tools for Formative Assessment
Come learn some easy-to-access, free or no-fee apps for formative assessment in the classroom, such as Mentimeter, Kahoot!, Flipgrid, Padlet, and Quizlet.

Build It with Hawksites: Online CVs / Resumes
Heard about Hawksites, but not sure what the buzz is all about? Come and learn how to set up your own virtual CV or resume to showcase your accomplishments, interests, publications, etc.
CodeMonkey Sandbox: Coding Is Elementary!
Keep hearing coding is all the rage? Come check out CodeMonkey, a tool that's being used increasingly in elementary school classrooms. We'll have access to a demo and can mess around and test our design thinking skills.

Common Sense Media: Unpacking Privacy
What's the deal with privacy, anyway? What's important to teach our students about what to look for when signing up for a new website or app? What data is actually being collected? Come to discuss the answers to these questions and more.

Digital Tool Playground
Check out edtech tools and devices currently being used in P-12 schools, such as green screens, robots, and the latest video creation tools.

Google Classroom: A Group Work Solution
Curious about Google Classroom? Come to this workshop to explore how to use it in the context of group work. You'll learn how to set up a group, as well as create, assign and assess an assignment.

ISTE Standards: Foundations of EdTech
The ISTE Standards for Educators are making waves as the foundational learning standards for instructors at all levels. They are malleable and thought-provoking, and we'll engage in a playground to think about the implications of each in the context of our own teaching and learning practices.
Makerspace I: Make Your Classroom Come Alive
Ever wonder what the buzz is all about when it comes to makerspaces? Learn about what they are, how to create them, and why you'd want to do so in the first place.

Makerspace II: Design It, Make It, Share It
Let's talk some more about makerspaces. Design, make, and share a thing that can be replicated in your current (or future) classroom. (You do not have to have attended the Makerspace I workshop to attend this.)

Meet the Experts
Join an informal discussion with a panel of P-20 edtech experts via WebEx.

Need to Know: Transferable Tech Skills
Don't have time to learn every new app and tool, but curious to know some basic ideas and skills that you can use across platforms, tools, and devices? Then this workshop, which will help you expand your transferable digital knowledge for the classroom, is for you.

Robotics Sandbox: Come Meet Dash & Dot
Let's get Dash & Dot out of the box and play. We'll experiment with what they can do, and check out some examples of how teachers use robots in the classroom.

Swivl, Screencastify & Green Screens: Video for Blended Learning
Curious about the nuts and bolts of creating engaging videos for blended learning environments? Come to this workshop to play around with Screencastify, a web-based screen-recording app; Swivl, a device that follows, records, and transmits instructors will teaching; and green screens using the iPad app DoInk.

Twitter for Teachers: Demystifying EdChats
Twitter is increasingly a go-to ecosystem for teachers at any level to locate information, collaborate, share, and learn when it comes to materials, pedagogies, curricula, and everything in between. Come learn about various edchats, how they work, and how to mine them for up-to-the-minute information on what's hot and what's not when it comes to teaching today.

NYedHub: P-20 Tech Conference

NYedHub built on the groundwork laid by the Smart School Summit, a regional P-20 edtech gathering in 2016 and 2017. The gathering followed these guidelines:

- Nominal registration fee ($25 per person)
- School districts and colleges encouraged to attend in teams
- Keynote speaker (we invited Monica Burns of @ClassTechTips in 2019)
- Interactive time with exhibitors during lunch
- Sessions provided in three formats across four concurrent sessions:
    - Workshops (75 minutes): hands-on, interactive, and on a specific tool or approach
    - Presentations (75 minutes): demonstration, research report, or dialogue
    - Spark Sessions (30 minutes): lightning fast and meant to introduce an idea

The 2019 NYedHub followed the following schedule:

Time	Sessions
8:00am	Coffee and Networking Registration
8:30am	General Plenary and Welcome
9:00am	Comics & Graphic Novels: Mixing Analog and Digital to Tell the Best Story
	Sustaining Growth and Change for 21st Century Learning
	Transforming the Tide of Education: One District's Vision for Cultivating Digital Citizens
	Using 'Fake News' to Build Empathy For All
10:25am	Code Creatively with BrainPOP EdTech for Teacher Prep: Preservice Expectations
	Effective Technology Integration: SAMR, DOK, and Danielson Girls and Robots
11:05am	Digital Citizenship and Media Literacy in the Post-Truth World
	How to Successfully Implement a 1:1 Program in a District: Lessons Learned
	Transforming PD through Swivl Video Coaching
	Virtual Reality in the Reading Classroom (without a headset!)
11:35am	Lunch and Exhibitor Time
12:35pm	New York State of Te(a)ch: Technology Integration and Teacher Preparation
	Unleashing the power of technology as a teaching tool
	Crafting Learning Plans Through Standards Based Assessment, Student Reflection and Data Inquiry
	The Efficacy of Single Sign On: What 3 Districts Are Doing!
2:00pm	Keynote Session- Dr. Monica Burns
2:45pm	Closing & Raffle

Slide Deck Template

The following slide deck (see tinyurl.com/ET4TPworkshopdeck for Google Doc version) provides a template for workshops following a to-with-by approach.
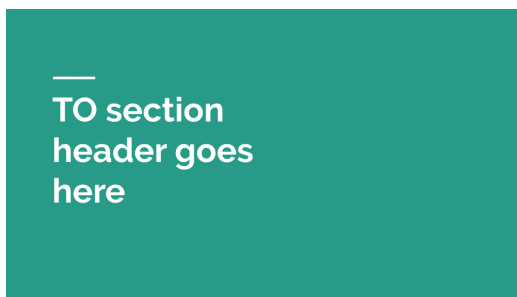
Title Goes Here
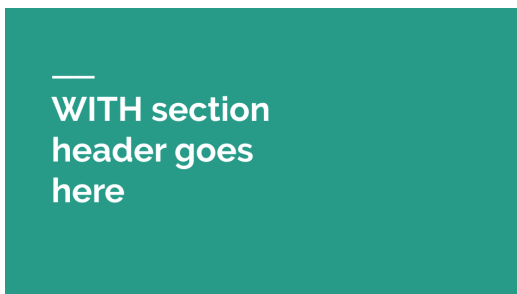
Program or Initiative Goes Here | Date X, 20XX
Presenter Name Goes Here

add short / tiny URL here for presentation
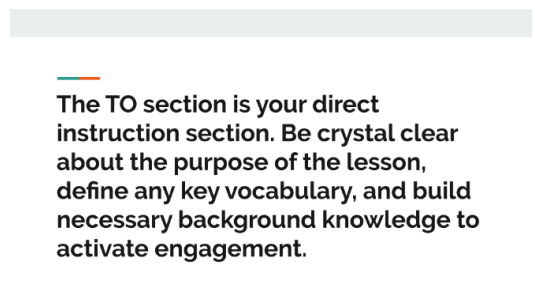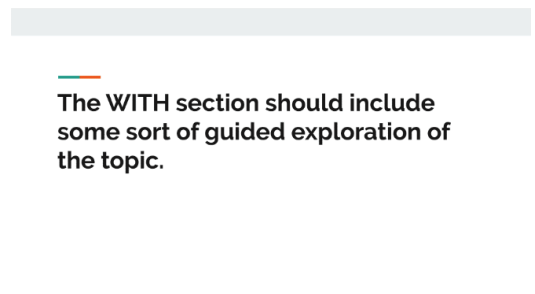
agenda

TO: [explain what will be taught]

WITH: [explain how you will explore it together]

BY: [explain what independent practice will look like]

TO section header goes here

The TO section is your direct instruction section. Be crystal clear about the purpose of the lesson, define any key vocabulary, and build necessary background knowledge to activate engagement.

WITH section header goes here

The WITH section should include some sort of guided exploration of the topic.

Virtual Professional Learning for In-service Teachers to Support Teaching and Learning in Online Environments

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The South Alabama Research and In-service Center (SARIC) is one of eleven regional in-service centers in Alabama. SARIC works in partnership with the University of South Alabama College of Education and Professional Studies (USA CEPS) and the Alabama State Department of Education to meet the professional learning needs of ten public school districts in the southern region of the state. In response to COVID-19, public schools in Alabama closed the physical buildings; however, instruction continued in a variety of digital formats. As a support to educators within those districts, SARIC collaborated with the faculty in the University of South Alabama CEPS and experts in the school districts. SARIC offered virtual professional learning sessions for P-12 educators. The virtual sessions were essential for many educators, and continuous supports are needed for teachers in the area of instructional design.

INTRODUCTION

As a result of the COVID-19 pandemic, in-service teachers were forced to move from face-to-face classroom instruction to designing and developing virtual learning. With the quick turnaround into virtual learning, teachers were seeking support for communicating digitally, integrating technology tools, designing online instruction, assessing students' levels of understanding, and serving students equitably through the online environment. Virtual learning involves educators designing and developing instructional materials, implementing tasks, and providing learning experiences that include students interacting with one another, the teacher, the content and pedagogy, and the technology through synchronous and asynchronous interactions (Abrami et al., 2011; Moore, 1989). To provide the necessary supports for in-service teachers to transition into virtual learning, virtual professional learning sessions were offered by the South Alabama Regional In-service Center (SARIC). The Technological Knowledge, Pedagogical Knowledge, and Content Knowledge (TPACK) Framework (Koehler & Mishra, 2005) served as the rationale for supporting in-service teachers in virtual professional learning sessions. In addition, principles from Knowles' (1973) adult learning theory informed the design and development of the sessions.

INNOVATION

SARIC offered virtual professional learning sessions to in-service teachers within ten school districts in the state of Alabama. The sessions focused on two perspectives. First, sessions focused on pedagogy for virtual learning including

topics on evidence-based best practices for virtual learning, creating interactive online lessons, and integrating assessment practices using digital tools. Second, sessions focused on specific technologies the districts were using to support students during COVID-19. These sessions included the following topics: Google Classroom, Google Meet, the G Suite for Education apps, Flipgrid, Nearpod, and technologies for screen recording. The sessions were selected based on district academic continuity plans to ensure the technologies were relevant to the needs of in-service teachers. In addition, participants were asked to complete a questionnaire to share topics of interests. The following link connects to the questionnaire used: https://forms.gle/rhVW3yK1oeHoHA5g9.

The questionnaire helped ensure SARIC was providing professional learning that was rigorous and relevant to the in-service teachers.

The sessions were one hour using Zoom and a schedule was shared with district leaders each week. The sessions were also advertised on social media allowing the center to reach more in-service teachers. The advertisements doubled the number of social media followers for SARIC. The flyers for the sessions can be accessed at the following link: https://drive.google.com/drive/folders/1q9LRTybVqzBorkWN2t8ryJ7yBD004O7-?usp=sharing. In-service teachers were required to sign-in to the sessions digitally and be an active participant throughout the learning experience. The digital sign-in form can be accessed at the following link: https://forms.gle/GcX48x7k6LZgMZZj9. Most of the sessions were facilitated by the University of South Alabama College of Education and Professional Studies (USA CEPS) faculty who were experts in the areas of instructional design, educational media and technology, and curriculum and instruction. However, a few sessions were co-facilitated by P-12 district educators as well as the USA CEPS faculty. Collaborating with higher education faculty who work with preservice teachers and connecting those faculties to in-service teachers were beneficial to both stakeholders. As continuous learners, the higher education faculty learned from in-service teachers, and were informed on what technology knowledge and pedagogy related to virtual learning was needed to support tomorrow's students. This information could be used to inform content taught in teacher preparation programs. In-service teachers learned from faculty the evidenced-based research for designing and developing virtual learning.

In the sessions, educators would discuss theory and practice of virtual learning in P-12. In-service teachers throughout the ten school districts in the southern region of the state attended the sessions, shared ideas verbally as well as through the chat window feature of Zoom, and provided feedback on future session topics. The sessions were designed to engage participants by using tools such as breakout rooms for small group discussions, polling features in Zoom, and allowing participants to engage and create products with the technology tools. A screen recording of the presentation with audio was created and shared with participants as a viewable link.

One of the school districts in SARIC's region collaborated by providing advertisements for the virtual sessions on social media along with providing access to the recorded sessions to all in-service teachers in their district. The screen recordings of the virtual sessions were shared with the local district and posted on the district's Information Technology Youtube Channel. The recordings can be accessed by all in-service teachers at the following link: https://www.youtube.com/channel/UCBFC6BXwp2cNDctulF6E-OA.

RESULTS

Lessons learned from offering virtual professional learning sessions during a pandemic include (1) in-service teachers want convenient, flexible, and relevant virtual options (Bayar, 2014; Killion, 2013, 2017); (2) professional learning in instructional design principles can not only benefit in-service teachers, but all educators; and (3) virtual options need to be offered in the future with multiple entry points and various levels of expertise.

Virtual sessions allow in-service teachers to participate in professional learning when it is convenient. Some of the advantages that emerged from feedback on the sessions included teachers not having to drive to a specific location and easy access through virtual platforms. In addition to convenience, adult learners are highly motivated to learn when there is a high need to the learn and the content presented is connected to work (Arghode et. al, 2017; Knowles, 1973). Hundreds of teachers registered and attended these virtual sessions because the content presented was relevant to the work they were doing during the pandemic. In-service teachers are knowledgeable of integrating technology to support face-to-face learning, but many were not equipped with instructional design skills related to virtual learning. Angeli and Valanides (2005) found that using an instructional design model to involve teachers in the instructional design process can increase their ability to design and develop more learner-centered digital instructional materials. Although in-service teachers were able to use information from the virtual sessions to increase their technological knowledge and understand-

ing of online pedagogies, future sessions on instructional design principles need to be offered to support in-service teachers (Davidson-Shivers & Hulon, 2019). Without additional job-embedded supports, educators may default to less effective approaches used in dated classrooms (Althauser, 2015).

In-service teachers possess a wide range of technological knowledge and skill (Williams, 2017). Because of this range, it is suggested virtual sessions with multiple entry points and sessions at various levels of expertise are offered in future sessions. In addition, incorporating a fluid agenda where in-service teachers could ask questions throughout the virtual session would be helpful.

IMPLICATIONS

Research indicates that effective teaching with technology is determined by the connection of the teacher's reflection of content, technology, and pedagogy (Koehler & Mishra, 2009). For in-service teachers to recognize the connections between content, technology, and pedagogy, professional learning must address those components along with increasing the teacher's capacity to integrate technology into teaching (Jimoyiannis, 2010, Crisan et al., 2007). According to Arghode et al. (2017), adults learn best when they are given an opportunity to choose the content and the method of learning. The virtual professional learning sessions were designed for in-service teachers to choose the topic that would be most beneficial to them during the pandemic regarding how to implement effective teaching and learning best practices within the online environment. In light of the data from the virtual professional learning sessions, the following implications are offered.

IMPLICATION 1: Virtual professional learning is pivotal for in-service teachers' growth during the pandemic. The closing of school happened rapidly. In-service teachers were searching for support in the area of virtual learning in order to design rigorous online lessons for students. The virtual professional learning sessions allowed in-service teachers to learn research-based skills and strategies necessary to develop an online course while increasing self-efficacy with technology and virtual learning. In addition, in-service teachers enjoyed the time and location convenience of participating in virtual professional learning. Using a virtual platform for professional learning is beneficial for teachers to grow professionally, develop collaboratively, and increase resources (Abramovich & Schunn, 2012). Schools should continue to utilize virtual professional learning to advance professional growth of in-service teachers.

IMPLICATION 2: In-service teachers need training on instructional design principles. According to Angeli and Valanides (2005), in-service teachers who had training in instructional design are more effective than those who have not been trained when it comes to designing and developing lessons that integrate technology. Instructional design models, specifically classroom-oriented instructional design models, provide the foundation of a systematic framework to establish guidelines for instructional planning for in-service teachers to follow to create high-quality instruction (Gustafson & Branch, 2007). The teaching effectiveness of the online instruction can directly be affected by the design of the instruction. Therefore, it is pertinent for in-service teachers to understand and constructively apply instructional design principles in the virtual learning process. The professional learning should focus on the specific technology needs of the school district to ensure it is relevant to teachers by conducting a needs assessment. Virtual or face-to-face professional learning will need to be provided to teachers to become knowledgeable of instructional design principles and provide training on how to incorporate the principles in virtual learning.

IMPLICATION 3: SARIC and local school systems worked together to provide effective professional learning to in-service teachers. During this experience, the collaboration between SARIC, USA CEPS, and local school districts was beneficial for all stakeholders. The collaboration involved experts from the USA CEPS faculty with expertise in instructional design, educational media and technology, and curriculum and instruction and P-12 district educators. All experts provided support for teachers regarding virtual learning and promoted partnerships for professional learning.

According to a study by Lee (2015), collaboration between colleges, public schools, and local education agents enhances a professional development program and is the focal point of building a teacher needs-based professional development program. In order for this collaboration to be effective, local colleges and school districts need to first meet for a collaborative planning session to discuss how each stakeholder can benefit, conduct a needs assessment to determine the areas for professional learning, develop a plan to roll out the professional learning. These planning sessions will identify learning outcomes, serve as a time for establishing a shared vision for the sessions, and determine the technical logistics of the sessions.

FUTURE RESEARCH

Since there was a tremendous amount of success with the virtual learning sessions, additional sessions will continue throughout the summer to prepare in-service teachers for the upcoming school year. To improve the sessions and further meet the needs of teachers, SARIC will analyze data from the sessions to determine the needs and types of virtual learning sessions that will be offered in the future. In order to improve engagement during the sessions, facilitators will be provided training on designing and developing collaborative virtual sessions. Access to the facilitator training presentation can be found at the following link: https://docs.google.com/presentation/d/1rRHXzoZg6HDTjE2udLB5RyUfgc2L9 C9TAvEpqMCei5A/edit?usp=sharing.

Recommendations for others who are doing work in this area is to provide teachers with instructional design principles to create high quality instruction, increase teacher self-efficacy in how to apply technological knowledge, pedagogical knowledge, and content knowledge through virtual professional learning sessions, and collaborate with various levels of experts to provide sessions (Gustafson & Branch, 2007; Koehler & Mishra, 2009).

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Preparing for eLearning Using Digital Learning Plans

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In recent years, PK-12 teachers in the U.S. have implemented eLearning days to mitigate disruptions to the instructional process. However, little consideration has been given to specific challenges facing individuals (e.g., teachers, students) accustomed to face-to-face learning environments as they experience eLearning for the first time. We surveyed administrators, teachers, and parents about challenges with and effective practices for eLearning. Initial results suggest that the immediate challenges facing PK-12 teachers' eLearning efforts include issues with preparing students and parents for this shift in context. Strategies for proactive eLearning planning for pre-service and inservice teachers are described.

INTRODUCTION

PK-12 teachers are increasingly integrating online learning as an extension to face-to-face experiences to mitigate disruptions to the instructional process (Digital Learning Collaborate, 2019; Graham et al., 2019). Prior to the onset of COVID-19, we (an assistant professor and advanced graduate student) were tasked with creating professional development modules focused on helping PK-12 face-to-face teachers in Indiana prepare eLearning instruction (i.e., online instructional for planned or unplanned school closures, IDOE, 2020). While previous research has identified challenges facing fully online PK-12 teachers (e.g., course organization, student pacing, see Farmer & West, 2019), more research is needed to understand the challenges confronting face-to-face teachers tasked with delivering eLearning during school closures. Previous research on teacher concerns (Fuller, 1969; Rakes & Dunn, 2015) and challenges regarding technology adoption (Hall & Hord, 1987; Rakes & Dunn, 2015) suggest that meaningful teacher professional development should be based on teachers' concerns. Therefore, to inform the development of our eLearning instructional modules, we surveyed parents, teachers, and administrators to learn about their eLearning concerns and challenges. We share the results from this initial analysis on eLearning instruction and suggest possible implications for eLearning preparation in a pandemic era.

INNOVATION

To understand how Indiana teachers, administrators, and parents approached and navigated initial eLearning experiences, we created a short survey using Qualtrics and shared the open-access link on Facebook in mid-February. Prior to posting the survey, we asked a retired, veteran teacher to review for clarity. The survey asked participants to share experiences with eLearning by describing 1) approaches/experiences, 2) effective practices, 3) challenges, and 4) ideas for improvement (See appendix for complete survey). Overall, 104 participants completed the survey: 67 parents, 32 teachers (17 preschool/elementary, 15 middle/high school), 2 school administrators, and 3 curriculum coaches. Using Excel, each researcher individually descriptively coded the data (Miles et al., 2014). Then, we compared coding results, synthesizing individual coding into themes. See Figure 1 for sample coding.

Figure 1. Sample Coded Responses.

RESULTS

Survey respondents described a variety of challenges with integrating eLearning:

- *Access*- no or limited access to Internet, resources (e.g., textbooks, learning materials), or devices (e.g., no or not enough devices for all children in a home)
- *Technical*- applications not functioning properly, platform compatibility issues (e.g., Windows, Mac), device compatibility issues (e.g., computer, tablet), Internet service interruptions, and login challenges (e.g., forgotten passwords)
- *Guardian Supervision, Support, and Frustrations*- unfamiliarity with content and inability to help students, competing work schedules and responsibilities, lack of parental involvement, parental frustrations with learning requirements (e.g., learning new technologies, intensive workload)
- *Design and Navigational Issues*- confusion around assignments or navigating resources, managing multiple websites and platforms, and frustrations from nonconcurrent curriculum
- *Administration and Facilitation Concerns*- unclear due dates and expectations, inconsistent or inadequate communication, inability to address student questions in a timely manner, limited assessment measures (e.g., real-time formative feedback, effectively measuring students' efforts), unclear attendance expectations
- *Student Motivation and Execution*- lack of student self-regulation and motivation, poor student time-management, home environment not conducive for eLearning, students not completing assigned work

Survey respondents also indicated several strategies that enhanced eLearning experiences:

- *Parents*- flexible due dates and pace, open communication lines with teachers, adopting a specific home routine (e.g., matching school routine, taking breaks), clear expectations and directions, and offline options (e.g., paper packets for daycare)
- *Teachers, Administrators, Curriculum Coaches*- creating clear expectations regarding grading and due dates, offering online and offline options, demonstrating tools/procedures, and offering opportunities to practice prior to eLearning experiences, keeping things simple, and communicating frequently

IMPLICATIONS

Our initial results suggest that the majority of the immediate challenges facing K-12 teachers' eLearning efforts include issues with preparing students and parents for this shift in context—issues that can be mitigated with proactive and intentional planning. Respondents' descriptions of effective eLearning practices highlighted the need for clearly articulated expectations and procedures. To prepare for effective eLearning, we suggest that teachers create a "digital learning plan" prior to implementing eLearning. Much like the procedures and expectations that regulate practices and activities in a face-to-face learning environment, a digital learning plan structures the eLearning space by establishing expectations and procedures regarding how, where, and when students will engage in eLearning and how content and technological support will be provided. We detail specific steps and strategies for creating a digital learning plan in Table 1.

Table 1

Steps to Creating a Digital Learning Plan

Step	Strategies
Identify unique characteristics and challenges of the learning context	• Survey parents/guardians (e.g., Google Form) about internet access, device usage, and guardian work schedules • Consider student characteristics and demographics (e.g., special needs, language ability, student development level) • Identify programs and platforms currently used in the classroom • Identify community organizations that could provide support and services during eLearning • instruction (e.g., internet hotspots in school parking lots, daycare, public libraries)
Create clear expectations regarding online classroom procedures	• Consult school, corporation, and state policy guidelines for eLearning practices • Develop procedures for handling each challenge (e.g., no access, lack of parental guidance) present in the learning context • Establish guidelines related to due dates, workload, attendance, instructional technologies that will be used, and communication methods/frequency • Solicit feedback and revise plan accordingly
Demonstrate eLearning procedures and offer practice opportunities	• Conduct an in-class eLearning practice day with students to familiarize them with procedures • Plan a pilot eLearning day and collect student and guardian feedback • Develop short screencasts of common online procedures that students will complete during eLearning experiences • Offer parents strategies for supporting learners' eLearning efforts (e.g., sample schedules)
Communicate digital learning procedures to students and parents	• Utilize communication forms and channels familiar to students and guardians • Communicate digital learning plans in multiple forms on multiple occasions • Offer virtual "open office" hours to address questions or respond to concerns

Creating a digital learning plan assists teachers in preparing for and facilitating technology-mediated instruction (e.g., eLearning, blended/hybrid learning, remote instruction). Digital learning plans require teachers to consider unique student, school, and community factors that will impact online instruction and plan ways to overcome any potential barriers caused by these factors. When communicated to parents and guardians, these plans inform appropriate expectations towards eLearning and outline how successful eLearning experiences can be achieved. We offer implications for preservice teachers (PSTs) and inservice teachers (ISTs).

Pre-Service Teachers and Education Programs

To effectively prepare for eLearning, teachers must have a thorough understanding of their instructional context and the challenges and opportunities available in the online environment. We echo the call for more courses, field placements, and pratica for online instruction within teacher education programs (Archambault et al., 2016; Kennedy & Archambault, 2012). Within traditional teacher education courses (e.g., special educational, educational technology, second language learning courses), teacher education faculty can sensitize PSTs to potential eLearning challenges and opportunities through problem-centered methods, such as simulations (Dalinger et al., 2020) and case-based learning (CBL; Goeze et al., 2014). For instance, CBL affords PSTs opportunities to deeply consider the complexities involved in educational environments from a variety of contexts and gain professional experience vicariously in a safe place (Gravett et al., 2017). Using rich and ill-structured cases, PSTs can participate in intentional discussions and activities that prompt the consideration of potential challenges in the teaching profession before being guided to articulate reasonable solutions (Koehler et al., 2018)—including consideration of situations focused on navigating abrupt shifts in learning environments caused by instructional disruptions (e.g., worldwide pandemics).

In-Service Teachers and Professional Development

As emphasized by the COVID-19 pandemic, there is a need to develop ISTs' abilities to effectively prepare for eLearning (Quiroz et al., 2016). Creating a digital learning plan can help ISTs facilitate conversations across grade levels,

departments, schools, and even districts regarding effective eLearning procedures. While specific eLearning activities and structure may vary across teachers and grade levels, administrative procedures and policy (e.g., student workload, grading, attendance) could be considered at a grade/department, school, or even district level to produce consistent eLearning experiences for students and parents (see Basham et al., 2016 regarding policy in online special education). If a shared vision of eLearning procedures is established across these groups, ISTs can be relieved of some stress associated with decision making during a crisis. Professional development efforts, then, can then be geared towards facilitating collaborative efforts around a common goal (see Richman et al., 2019)—goals that focus on the best ways to design and implement digital plans for eLearning. Finally, creating digital learning plans can assist ISTs in identifying areas of future professional development. As areas of concern are identified, professional development opportunities corresponding to these areas of need could be created to overcome concerns related to eLearning and technology integration (Hall & Hord, 1987).

FUTURE RESEARCH

From this research, we learned that eLearning presents significant challenges for parents, teachers, and administrators. To prepare effective eLearning instruction due to COVID-19 or similar school disruptions, teachers should first proactively address concerns with eLearning. In order to be prepared to create meaningful digital learning plans, PSTs need field placements in online settings and course work focused on teaching and learning in diverse contexts, including eLearning. At the same time, digital learning plans can facilitate conversations with school leaders and inform goals for professional development for ISTs related to eLearning during trying times.

Additional research is needed to fully realize the impact of a thoughtful digital learning plan, to establish best practices for developing and implementing these plans to support eLearning, and to determine how PSTs and ISTs can best be supported when developing these plans. Specifically, to improve upon our initial conceptualization of digital learning plans, we plan to explore the concerns of educational stakeholder groups by completing a deeper investigation into their experiences, offer professional development on the creation of digital learning plans for eLearning settings, and investigate the impact of our training and the use of digital learning plans. From these investigations, we offer insight into how to best prepare and support PSTs and ISTs to create eLearning.

The steps outlined here provide teachers with a flexible framework for investigating and planning for challenges unique to their classroom, school, and community. Informed by student characteristics, resources, and state and local policy, these digital learning plans can establish procedures and expectations for all stakeholders (e.g., students, guardians, teachers, administrators) to allow instruction to continue during disruptive circumstances. The steps provided here can be adapted to create an effective plan that fits within unique learning contexts. With a clearly established digital learning procedure, distractions and confusion can be eliminated, and teachers and students can shift their focus to integrating innovative methods and technologies that can provide engaging eLearning experiences.

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Survey

In recent years, the Indiana Department of Education has established the use of "eLearning Days" in schools. Across Indiana, schools are expected to offer these experiences to their students in an effort to continue "an instructional day away from traditional time limits and brick and mortar setting" (IDOE, 2019).

You have been invited to participate in a short survey to share your experiences with eLearning days. Your participation in this study is voluntary which means that you may choose not to participate at any time without penalty or loss of benefits to which you are otherwise entitled. You may ask questions to the researchers about the study whenever you would like. If you decide to take part in the study, you will be asked to answer a short survey. You can contact the primary investigator (Adrie Koehler) by e-mailing adrie@purdue.edu.

By clicking Yes, you consent that you are willing to answer the questions in this survey.
- ○ Yes
- ○ No

From what perspective are you completing this survey?
- ○ Parent (*if selected, user is taken to Parent Perspective section*)
- ○ Teacher (*if selected, user is taken to Teacher Perspective section*)
- ○ Administrator (*if selected user is taken to Administrator, Educational Technology Specialist, Curriculum Coach Perspective*)
- ○ Curriculum Coach (*if selected, user is taken to Administrator, Educational Technology Specialist, Curriculum Coach, Other Perspective*)
- ○ Educational Technology Specialist (*if selected, user is taken to Administrator, Educational Technology Specialist, Curriculum Coach, Other Perspective*)
- ○ Other (*if selected, user is taken to Administrator, Educational Technology Specialist, Curriculum Coach, Other Perspective*)

PARENT PERSPECTIVE

1. What level is(are) your child(ren)?
   - ☐ PreK
   - ☐ Elementary
   - ☐ Middle/Jr. High
   - ☐ High School

2. Describe assignments that your child(ren) was(were) expected to complete for eLearning days. For instance, what were they expected to do online and offline?
3. What worked well for you and your child(ren) when completing eLearning days?
4. What challenges did you and/or your child(ren) experience when completing eLearning days?
5. What would improve eLearning days for you and your child(ren)?

TEACHER PERSPECTIVE

1. What grade level of students do you work with?

2. If applicable, what is your content area?

3. Describe how you approach eLearning days. For instance, what is a typical eLearning experience for your students? What are online and offline activities that you include?

4. What worked well for you and your students with eLearning days?

5. What challenges did you and/or your students experience when completing eLearning days?

6. What would improve eLearning days for you and your students?

ADMINISTRATOR, ED TECH SPECIALIST, CURR. COACH, OTHER PERSPECTIVE

1. What is your position?

2. Describe how you approach eLearning days. For instance, what are your expectations for a typical eLearning experience for your teachers and students? What offline and online activities do you expect students to experience?

3. What worked well for you and your school/corporation with eLearning days?

4. What challenges did you and your school/corporation experience when completing eLearning days?
5. What would improve eLearning days for you, your teachers, and your students?

Building Resilience in New Zealand Schools through Online Learning

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For over a decade the Virtual Learning Network (VLN) Primary School has provided online distance education for students in New Zealand primary (K-8) schools in subjects they have been otherwise unable to access. The VLN Primary School used their experience and expertise in distance education to contribute to the COVID19 response coordinated by the Ministry of Education, by providing synchronous (real time) online classes and asynchronous independent learning resources for students and their usual classroom teachers. Schools selected subjects areas which they were otherwise unable to access and/or they were seeking to develop further expertise. The online distance education provided professional learning development for the classroom teacher both in teaching that subject area, and in online teaching. Feedback from schools previously participating with the VLN Primary was that their staff and students felt well prepared for Covid19 lockdown teaching and learning online, by their experience with the VLN Primary.

INTRODUCTION

Traditionally participating in an online class has been the domain of students but in New Zealand primary schools, classroom teachers have been participating alongside their students. This embodies the Māori pedagogical concept of *'ako'* which means "both to teach and to learn. It recognises the knowledge that both teachers and learners bring to learning interactions, and it acknowledges the way that new knowledge and understandings can grow out of shared learning experiences" (Ministry of Education, 2009, p. 28). The online classes are part of the COVID-19 distance learning support response, coordinated by the New Zealand Ministry of Education to provide online programmes for students and their teachers (Ministry of Education, 2020). The model of working with schools in the VLN Primary COVID-19 programme was designed to be inclusive of classroom teachers so they were able to learn alongside their students and become more confident in teaching and learning online (Whalley, 2020). Online, 'virtual' learning or distance learning has been taking place in New Zealand schools (K-12) for the last two decades (Barbour & Wenmoth, 2013; Roberts, 2009, 2010a; Wenmoth, 2019; Whalley & Barbour, 2020). As a collaborative initiative, the VLN Primary (K-8) provides online distance education for schools in a broader range of subjects than their students might have otherwise been able to access. The schools working with the VLN Primary collaborate to contribute teachers in a learning area in which they have expertise, or make a payment to a collective funding pool (VLN Primary School, 2020).

INNOVATION

Online pedagogy represents a significant change in practice for classroom teachers. Developing expertise and skill takes time and requires support (Redmond, 2011; Roberts, 2010b). Online teaching competences include facilitating content, design, technology and process decisions (Goodyear et al., 2001). Online teaching thus requires combining knowledge of content, pedagogy, and technology (Mishra & Koehler, 2009). It requires supporting learners to access the learning, to be motivated and confident to participate, and exchange information (Salmon, 2003). Experienced teachers lacking online teaching experience gain confidence and benefit from mentor support (Redmond, 2011).

In response to COVID-19, a number of New Zealand teachers enrolled in weekly online classes for their students and themselves. In addition to taking part in the online synchronous (i.e., real-time) classes, students and their teachers had access to asynchronous (i.e., not real-time), assigned independent learning activities. Here's how it ran:

Synchronous online classes use *Zoom* video-conference software.

1. Students and their class teacher and participate in an online class. The teacher communicates by audio and video (nods and hand signals give immediate feedback)
2. Text chat messages can be sent to individuals/all, and are used to share links to online interactive activities such as *Quizlet Live*, *Kahoot* and *Padlet*.
3. *Zoom* poll or *Google* quizzes are also used to gather information to inform teaching.
4. Teachers/students can share screens with for example a presentation using *Google* slides or a video or to collaboratively 'write/draw' on the online whiteboard.
5. *Zoom* can be used to share more than one screen to for example concurrently display a learning task, and to collaboratively work through an example.
6. Breakout rooms support collaborative activities or student support in smaller groups.
7. Flexible *Zoom* settings enable teachers to select/change audio, video, screen sharing and chat security depending on their requirements.
8. Features such as 'mute all' differ from face-to-face classroom practice and can be useful!
9. For example a mathematics class teacher might co-construct/solve a problem interactively using the online whiteboard, then learners independently try an example, (or create an extension challenge that applies the concept), then the class discuss the solution, and finally reinforce the concept in an interactive online team game.

Asynchronous independent learning is supported via learning management systems (e.g., *Google Classroom* and *Seesaw*).

1. Resources and messages are available for students to access anytime.
2. Presentation slides and video recording of online class are shared.
3. Students can create a digital record of their learning using text, images, voice recordings and other digital artefacts such as code or music.

Online curriculum planning and learning management resources are shared with the classroom teacher (examples of curriculm resources are shared in https://sites.google.com/vln.school.nz/curriculum/home, while further detail about how online learning can be organised is presented at https://hail.to/nex/video/M4Waivc). A 'Teaching Online Support Guide' was created and shared with teachers (see https://sites.google.com/vln.school.nz/teachingonline/) Guidelines for school leaders were also produced (see https://hail.to/app/vln-primary-school/article/view/OFHkxpO).

RESULTS

Schools who were active in the VLN Primary prior to COVID-19 were surveyed with the question:

Has your participation in the VLN Primary contributed to your confidence and readiness to take your learning online during this period of school shutdown? If so how?"

The feedback received was consistent in that teachers felt they were better positioned to adapt to their current situation of teaching and learning online from home. Teachers reported they felt more confident because they were familiar with the online platforms used by the VLN Primary and they had been supported to use them. They were more comfortable with their students being independent learners, and students were stepping up to help other learners and their teachers with their online learning from home (Education Gazette Editors, 2020).

The complete data set has been collated at https://bit.ly/3drFFOQ. However, with the sort of feedback from schools participating in online learning with the VLN Primary described in the previous paragraph, it could be expected that more teachers participating in the COVID-19 programme would become comfortable with teaching and learning online.

IMPLICATIONS

In an apprenticeship model of professional learning, a mentor or teacher models the process, and provides guidance and scaffolds to the learner (Pellegrino & Hilton, 2012). By participating in online classes with their students, teachers can be apprenticed into online and distance teaching (Rice et al., 2008). Collaborating with an experienced online teacher provides a professional learning opportunity for the classroom teacher, as well as support and online resources to enable them to teach their own learners online (Rice & Dawley, 2007). In addition students gained access to online class subjects they might have been otherwise unable to (Whalley & Barbour, 2020).

Professional learning benefits of being part of a teacher network include opportunities for collaboration, access to exemplars, and mentoring (Darling-Hammond et al., 2017; Harasim et al., 1995; Trust et al., 2016). School leaders supported their teachers to upskill in online teaching and learning by joining an existing teacher network, the VLN Primary in New Zealand. Classroom teachers gained access to online subject resources and planning, and support to participate in synchronous online classes and asynchronous learning (Barbour & Bennett 2013). They saw examples of interactive, engaging activities to use and adapt in future online teaching. Collaboration offers significant benefits for teachers and their students (Killion, 2015). The opportunity to collaborate with, and learn from other more experienced teachers, and have access to curated, developed online teaching resources, was a support for teachers who were asked to teach in online environments with little or no time to prepare (Whalley, 2020).

Through the modelling and support given to schools participating in the VLN Primary COVID-19 programme and the potential increase in skills and confidence gained by teachers, schools should be enabled to be more resilient to the current challenges of COVID-19 and become more future-focused and adaptive to future change (Barbour, 2011). Further development in building a collaborative, connected network of teachers who teach online is highly recommended for resilient and adaptable ongoing provision of education (Dawley et al., 2010).

FUTURE RESEARCH

Future research is needed to explore teacher professional growth and collaborative practice across schools through participation in online and distance learning, with a view to identifying wider school system level gains. Despite increasing interest in virtual schooling there is a dearth of research relating to online learning and teaching (DiPietro et al., 2010). How would teacher professional growth in online and distance learning impact on strengthening teaching and learning capacity in a schooling network? This could potentially illustrate benefits of online and distance learning that go far beyond the individual student taking an online class, to benefits in the wider education setting. This research would inform teacher practice by exploring effective collaborative practice in online distance settings and factors that influence teacher professional growth. It would also inform policy decisions about how online and distance learning initiatives can contribute to system wide teaching and learning capacity and resilience.

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Research-based Design Recommendations for Transitioning a Computational Thinking Integration Summer Professional Development to a Virtual Format

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Infusing Computing is a three-year professional development project that supports middle and high school teachers in integrating computational thinking into their disciplinary teaching. During the first two years of the project, 266 teachers (99 individuals, 167 members of school-based teacher teams) attended week-long summer workshops and participated in ongoing support activities (e.g., webinars, a podcast series, and a Slack community) during the academic year. This paper describes how we drew on analysis of participant data from previous participants of the program and online learning theory to shift the professional development to a virtual format.

Introduction

Infusing Computing was designed according to Desimone's (2009) five core concepts: content focus, active learning, coherence, duration, and collective participation. Using these concepts, we developed the Code, Connect, Create (3C) model for our professional development (PD), in which each session has a different content focus, with all emphasizing active learning, collective participation, and coherence (Jocius et al., 2020). Code sessions provide instruction on programming in Snap (https://snap.berkeley.edu/), Python, or Netsblox and offer examples of code snippets that align to the computational thinking (CT) strategies that we label as PRADA: pattern recognition, abstraction, decomposition, and algorithms (Dong et al., 2019). Connect sessions support teachers as they learn to integrate CT with their content standards. Create sessions offer targeted support as teachers design lessons for classroom implementation. Through the 3C sessions and ongoing academic-year supports, teachers collaboratively develop shared notions of computing and computational thinking practices that build on the models, vocabulary, interactions, and participation structures within computer science (Brennan & Resnick, 2012; Yadav et al., 2016). The virtual version of *Infusing Computing* (www.infusingcomputing.com) will further integrate the community of inquiry framework (Garrison et al., 2000) to attend to cognitive, teaching, and social presence to better support participants and maintain active learning, coherence, and collective participation.

Innovation

Due to COVID19, we will be shifting our week-long *Infusing Computing* in-service teacher professional development to a virtual format for Summer 2020. The PD will involve approximately 180 teachers (120 new teachers and 60 teachers returning from previous years), as well as teacher leader facilitators. Based on findings from our analysis of previous teacher PD, we have adapted the Code, Connect, and Create sessions to incorporate the community of inquiry framework to attend to cognitive presence (interactive virtual activities using pre-designed scaffolds, reflective activities after each session), teaching presence (discussion guides and response frameworks; additional facilitators and teacher leaders), and social presence (opportunities for collaboration in whole-group, small-group, and use of Slack to facilitate open communication) (Garrison & Arbaugh, 2007). Using our prior data and the research literature, we created the table below to depict the changes we are making to face-to-face components from the 2018 and 2019 summer PD workshops, the literature supporting each component/change, and how those changes will manifest in the virtual format.

Face to Face Components	Supporting Literature	Changes for Virtual PD

Snap*!* Homework
 Sent 1 week prior to PD
	-Scaffolded programming support (Angeli & Jaipal-Jamani, 2018) to develop coding abilities	**Virtual Pre-Sessions**
		 (synchronous and asynchronous)
		   -Google Drive
		   - Zoom or Hopin
		
		 Snap*!* Homework

Opening Session *Time:* 1 hour (Day 1) *Content*: Project and CT Introduction *# of participants*: ~180 teachers	-Logistics overview -Co-develop common CT definition (Yadav et al., 2017)	**Virtual Opening Session** *Time:* 30 minutes (Day 1) *Content*: Navigating a Virtual PD and CT Introduction *# of participants*: ~180 teachers *Supports:* Slack or Hopin backchannel discussion
CODE *Time*: 1.75 hours/day *Facilitators*: CS teacher-leaders *Content*: Introduction to programming *Breakout*: by experience level (beginner, intermediate, netsblox, python) *# of participants*: 20-30 per room	Engagement in activities that capitalize on the overlap of CT and disciplinary practices (Yadav et al., 2016)	**Virtual CODE** *Time*: Shift to scaffolded reflection and guided work 10 minutes: Introduction 30-45 minutes: Independent work time in small groups 15-30 minutes of check-in and reflection) *Facilitators*: 2 CS teacher-leaders and 2 HS CS I terms assist per session *# of participants*: 12 per room

CONNECT *Time*: 1.25 hours/day *Facilitators*: Disciplinary teacher-leaders *Content*: Explore CT strategies through a disciplinary lens *Breakout*: Content area *Number of participants*: 20-30 per room	Learning from peer teachers (Barr and Stevenson, 2011) for meaningful interaction with content and CT practices and skills (Yadav et al., 2016)	**Virtual CONNECT** *Time*: 60 minutes 10 minutes: Introduction 30-45 minutes: Independent work in small groups via breakout rooms 15 minutes: Reflection *Facilitators*: Disciplinary teacher-leaders and returning teachers *Supports:* Slack or Hopin backchannel discussion *# of participants*: 12 per room
CREATE *Time*: 2 hours/day *Facilitators*: CS and disciplinary teacher-leaders *Content*: Develop lessons that infuse CT with content area standards *Breakout*: Teams or individuals *Number of Participants*: 20-30 per room	Teachers need "sufficient time to learn technology and integrate it into their lessons" (DiMaria, 2016)	**Virtual CREATE** *Time*: 2 hours/day, plus virtual office hour sessions *Facilitators*: Both CS and disciplinary teacher-leaders float among break out rooms *Content:* 10 minutes: Sharing pre-designed scaffolds and models 90-120 minutes: Work Time 15 minutes: Reflection *# of Participants*: 1-4 per room
Virtual One-on-One Zoom Sessions: High School Interns students HS students were available via Zoom for technical support and Snap! Content development	-Reduce the cognitive load to build teacher self-efficacy in CT concepts and practices (Bower et al., 2017) .	**Virtual One-on-One Zoom Sessions** Facilitators: Additional HS student interns HS interns also assist in Code sessions

The third column highlights the addition of asynchronous (non-real time) activities for approximately half of the time in Summer 2020 PD sessions. Synchronous (real-time) help will be available "on demand" to support participants throughout all sessions, but we will intentionally encourage asynchronous communication among our participants. Mabrito (2006) found that when students communicated more in synchronous formats, "much of this communication was devoted to exploring topics of discussion and didn't receive much further exploration or development from the group," but that asynchronous communication led to a "majority of time expanding upon topics" (p. 99). This aligns with the emphasis of our PD. We have also worked to purposely include networking opportunities to foster a virtual community of practice (Wenger et al., 2002). Our PD strives to help in-service teachers examine CT elements (PRADA) that are repeated in each session (Code, Connect, Create) throughout the week with the goal of making meaning of PRADA within their own content and their own context. Therefore, it is vital for teachers to have time, space, and opportunities to communicate in multiple ways to expand upon how computational thinking infuses into their curriculum.

Results

To ensure that all changes were grounded in analysis of empirical data, we reviewed survey responses from 2019 Infusing Computing participants (n=130) and facilitators (n=23). Quantitative responses were analyzed to compile descriptive statistics, while qualitative responses were analyzed using open and axial coding to identify themes and categories (Charmaz, 2006). Analysis revealed the need for additional support in the following areas: pre-designed lesson models and starter code, consistent structure, teacher collaboration, technology pre-training, facilitator training, and collaboration.

Our analysis was used to design virtual supports that were grounded in both the literature and our previous participants' experiences. For example, 47.8% of facilitators suggested that a more consistent structure would build cohesion across Code, Connect, and Create sessions, so we designed virtual sessions that integrate facilitator modeling and purposeful discussion prompts, scaffolded work time, and targeted reflection. Similarly, participants suggested that pre-de-

signed lessons would enable teachers to focus more on the pedagogical design of their lessons, so we developed a library of starter code and lesson models for teachers to adapt for their disciplinary standards and teaching contexts. We aligned the scaffolds with the community of inquiry framework (Garrison et al., 2000) to attend to the need for active learning and collective participation.

Implications

When redesigning *Infusing Computing* for a virtual environment, we found it useful to draw upon previous research on CT integration, teacher PD, and online teaching. Then, we analyzed previous data to consider how we could capitalize on virtual tools to support authentic engagement in the PD. For others who are considering redesigning PD for virtual environments, we recommend first surveying participants or analyzing prior data to intentionally create scaffolds that align with the PD goals and participant needs. One of the key needs we identified, for example, was the need for interaction and connection across the virtual space (Garrison & Arbaugh, 2007). To address this issue, we have reduced the number of participants in each virtual session and doubled, often tripled, the number of facilitators. We have also increased the number of avenues teachers will have for both synchronous and asynchronous communication with peers and facilitators. These changes were designed to create more opportunities for engagement among peers and facilitators. We have designated at least two facilitators in each session with specific roles--one to focus on instruction and another to monitor participant interaction and progress. Based on our analysis, we have also created consistent session structures, reduced the number of participants assigned to each "room", and created pre-designed starter code and lesson plans.

The literature and previous experience also show that tool selection is an essential consideration for a virtual format (Dede, 2008). The tool(s) should not only be easy for participants to use, but also align with the goals of the PD. They should also be limited in number to avoid confusion. We are choosing a focus on asynchronous communication in an effort to encourage breadth and depth of ideas through thoughtful discussion (Marbrito, 2006). However, we are also providing multiple lines of communication to help each teacher find a method that works for them as our participants have varied backgrounds and expertise in instructional technology and coding. We are considering at most three tools for the week to cover all of our needs. Asynchronous communication will take place in Canvas, our learning management system. The system allows participants to share files, communicate via discussion board or conversations, and allows other integrated features such as Google Drive, "Collaboration", and "Conferences".

Information on our PD, as well as the library of starter code and lesson models is available at: www.infusingcomputing.com under Library. For other PD that includes coding, we recommend using collaborative programming tools, such as Netsblox for Snap block-based coding (https://netsblox.org/) or repl.it for Python (https://repl.it/@enaard/Python-3), to encourage greater teacher interaction, specifically through pair programming (Goode, Margolis, & Chapman, 2014), as they learn to code and create CT-infused lessons.

Future Research

To support authentic and meaningful in-service teacher PD in virtual settings, we have three recommendations: (1) offer pre-designed models, scaffolds, and support to provide illustrative examples of PD products; (2) design frequent reflective activities that follow each virtual session to offer opportunities for active learning and collective participation; (3) increase facilitator support and open communication channels to encourage collaborative interactions. We plan to study the impact of these recommendations using data collected during the 2020 PD sessions. Our aim is to develop a comprehensive design framework for virtual PD to assist teachers in infusing computing into their classrooms.

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Acknowledgement

Lessons Learned Moving an Elementary Science Methods Course to Emergency Online Delivery

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The COVID-19 pandemic precipitated a rapid and unprecedented shift to online delivery of university coursework around the world. This was a challenging shift for educators and learners alike. Here we describe how one educator worked to transition an elementary science methods to online delivery while maintaining key pedagogical approaches; and what the experience of shifting to online delivery was like for one prospective teacher who was enrolled in the course. We offer suggestions and resources for other instructors who find themselves moving what is typically a hands-on, face-to-face course to one which will be delivered entirely online.

INTRODUCTION

In this chapter we describe the shift from face-to-face instruction to online delivery from the perspective of instructor and student in an elementary science methods course. This course was designed to prepare prospective elementary teachers to teach science by engaging students in the practices of science (National Research Council, 2012) and eliciting and using students' ideas (Rosebery & Ballenger, 2008). Modeling and unpacking science teaching practices is a primary pedagogical approach in the course (Grossman, 2018). Pam Grossman and her colleagues advocate an approach to practice-based teacher education that identifies "core practices" of teaching and supports novice teachers in learning how to enact them competently. Examples of core practices include facilitating whole-class discussion, eliciting student thinking, and maintaining classroom norms. The contributors argue that teacher education needs to do more to help teachers master these professional skills, rather than simply emphasizing content knowledge. Teaching Core Practices in Teacher Education outlines a series of pedagogies that teacher educators can use to help preservice students develop these teaching skills. Pedagogies include representations of practice (ways to show what this skill looks like and break it down into its component parts. This approach is ideally suited to a face-to-face context. However, redesigning the last six weeks of the course to integrate key ideas of science teaching and teacher education into fully online delivery was a challenge. Furthermore, the course redesign needed to account for students' new situations while still meeting the course learning outcomes. The course redesign returned to principles of effective online teaching proposed in *Minds Online* (Miller, 2016).

INNOVATION

The innovations described here occurred in an undergraduate elementary science methods course that had previously been 100% face-to-face delivery. There were 18 students enrolled in the course who were in the second semester of a four-semester teacher preparation program. In this section we describe the key elements of the course redesign.

Hands-on Activities

Modeling hands-on science lessons was a key strategy (Grossman, 2018). Pam Grossman and her colleagues advocate an approach to practice-based teacher education that identifies "core practices" of teaching and supports novice teachers in learning how to enact them competently. Examples of core practices include facilitating whole-class discussion, eliciting student thinking, and maintaining classroom norms. The contributors argue that teacher education needs to do more to help teachers master these professional skills, rather than simply emphasizing content knowledge. Teaching Core Practices in Teacher Education outlines a series of pedagogies that teacher educators can use to help preservice students develop these teaching skills. Pedagogies include representations of practice (ways to show what this skill looks like and break it down into its component parts in the course. In order to continue this teaching practice, we built model science lessons that used online simulations and videos (*Online Resources for Science Laboratories*, 2020). The segmenting principle (Miller, 2016) was used to create lesson guides to support effective use of multimedia elements. One example of this was a hands-on activity about moon phases that was adapted to use an online simulation and a video (see https://marticanipe.files.wordpress.com/2020/05/guidedexploration-moonphases.pdf). The guide was created to engage students in exploring the phenomenon before explanations were introduced which was a guiding pedagogical principle of the course (Gunckel, 2010).

Lesson Planning with GoogleDocs

Part of the course's signature assignment was a detailed lesson plan. In this assignment students prepare drafts which they revise based on instructor feedback. Students worked on this using GoogleDocs. Three features of GoogleDocs were especially useful: in-line document feedback, email notification of changes, and synchronous viewing of documents. Using these features the instructor and students were able to work together on the document during individual Zoom conferences as well as use the email notifications to address feedback and questions asynchronously and in a timely manner.

Weekly Guides

Two concerns with moving all coursework to online delivery was how students would manage their time without the structure of in-class meetings and the tendency of students to underestimate the time required to be successful in online learning (Miller, 2016). To address this, we used weekly guides (see https://marticanipe.files.wordpress.com/2020/05/weeklyplan.pdf for an example) that were posted on the LMS (learning management system) and emailed to students every Friday for the upcoming week. Included in the email was an estimate of how long it would take to complete each task to assist students in planning their work for the upcoming week. After the first week, students provided feedback on how realistic the time estimates were and the estimates for future weeks were refined using that information.

Synchronous Meetings on Zoom

After initially considering continuing to meet synchronously via Zoom during scheduled class time, we realized this was not going to be feasible. Instead, the course used short group sessions and individual meetings via Zoom paired with asynchronous assignments. This allowed students to maintain connections with one another, ask questions, and work in small groups via Zoom breakout rooms while accommodating individual students' challenges. Recordings of all group sessions were posted on the LMS in order to give students asynchronous access if they could not make the scheduled session as well as to enable students to review the material that was part of the group sessions as needed.

RESULTS

Anecdotal evidence suggested most students managed academic aspects of the shift to online delivery fairly well. They continued to progress in their coursework and achieved course learning goals. Eighty-nine percent of the students finished were able to complete all course assignments satisfactorily and 94% of them earned a course grade of "A" or "B" which is typical of this upper division, major course. However, this situation also led to a number of challenges for students that were hard for the instructor to directly observe.

When asked to share what the emergency shift to online instruction was like from the student perspective, one student shared their perspective on the difficulties of being a student and dealing with the pandemic:

> I am grateful to be able to be home, however being secluded from the world, helping my family, and doing school is hard. Since everyone does not know what is happening or what tomorrow holds, it can be frustrating trying to schedule and do things. Being constantly worried about the virus and waiting for updates with the additional stress of school work can be overwhelming at times.

In addition to the general stress of the situation, students reported a wide range of issues. Some had problems finding reliable Internet access or private spaces to participate in synchronous meetings. Others had new or increased time constraints including responsibilities at home, jobs as essential workers, and taking on additional work to contribute to family finances. The ability of students to successfully complete the course suggests that at least some of the changes supported students in being able to manage new stressors and complete their coursework.

IMPLICATIONS

Implications from our experience during the emergency shift to online delivery can be considered in light of developing plans for delivery of traditionally face-to-face courses in either fully online formats or some type of hybrid format. From our experiences we can offer the following suggestions:

- Using a blend of synchronous and asynchronous online activities seems to support students who were dealing with challenges outside of their coursework (Higher Ed Learning Collective, 2020; Major, 2015). Additionally, making a recorded version of the synchronous activities available was an important resource for these students.
- Some students reported choosing face-to-face courses because of their preferred learning modality so it was important to incorporate tools that approximate some of the benefits of in-person courses (Major, 2015; Miller, 2016). For example, providing weekly guides and estimates of how long tasks should take to complete can help provide structure and external accountability for students in a similar way that weekly class meetings do.
- Making use of online collaborative tools (e.g. GoogleDocs) was another important way to approximate the benefits of in-person instruction (Major, 2015). These collaborative tools enabled instructors and students to work together synchronously in a way similar to how they might interact in a classroom or during office hours. They also had the added benefit of offering asynchronous collaboration as well.
- For teacher educators in particular, it is important to consider how what they are doing can serve as a model (Grossman, 2018)Pam Grossman and her colleagues advocate an approach to practice-based teacher education that identifies "core practices" of teaching and supports novice teachers in learning how to enact them competently. Examples of core practices include facilitating whole-class discussion, eliciting student thinking, and maintaining classroom norms. The contributors argue that teacher education needs to do more to help teachers master these professional skills, rather than simply emphasizing content knowledge. Teaching Core Practices in Teacher Education outlines a series of pedagogies that teacher educators can use to help preservice students develop these teaching skills. Pedagogies include representations of practice (ways to show what this skill looks like and break it down into its component parts of effective online pedagogy (Miller, 2016). In the current environment, it is likely that prospective teachers who are our students today will be asked to provide online delivery to their future K-12 students and they need effective models to draw on.
- The unprecedented situation of a global pandemic also spurred the development of a community of educators committed to sharing what they learned as courses were moved online and the tools that supported this move (Higher Ed and The Coronavirus, 2020; Higher Ed Learning Collective, 2020). It was helpful to tap into this crowd-sourced wisdom rather than to face the challenge alone. Moving forward, it is important for educators to draw on and contribute to the wisdom of this community (see the appendix for resources).

- Finally, our experience revealed that an instructional approach grounded in patience and flexibility for students and instructors alike is the best way to deal with an unexpected shift in instructional delivery.

FUTURE RESEARCH

The circumstances of the spring semester offer several avenues for future research. Plans are underway to conduct research to examine not only the outcomes of this course, but also how the emergency shift to online delivery was handled by others teaching similar courses. Additionally, the entirety of the summer session has been shifted online so the entire methods course will be taught online. This will offer an interesting opportunity to compare the emergency shift to a course that was shifted from the start. Also, data has been collected from face-to-face methods course for the last four years that provides an interesting comparison group to examine differences (if any) in outcomes of the various modes of delivery. This work and work like it may be important as we move into a fall semester likely to include some types of online instructional models. Therefore, it is critical that researchers looking at the impact of these shifts share their work in a variety of venues including some that are non-traditional spaces for sharing academic research (e.g. social media) and those whose focus is rapid dissemination. It is also important that those of us new to online delivery learn from each other as well as experts, like Michelle Miller (2016) who study this modality.

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APPENDIX

Collaborative Tools

Doodle (for scheduling synchronous individual meetings) – http://doodle.com

GoogleDocs (for collaboration) – http://drive.google.com

Zoom (for video meetings) – http://zoom.com

Crowd-sourced and Community Resources

Facebook Groups
Higher Ed and the Corona Virus - https://www.facebook.com/groups/higheredandcoronavirus
Higher Ed Learning Collective - https://www.facebook.com/groups/onlinelearningcollective

Crowd-sourced Lists of Resources

COVID-19 Resources for Higher Education - https://edunav.com/covid-19-resources-for-higher-education
Online Resources for Science Laboratories - https://docs.google.com/spreadsheets/d/18iVSIeOqKjj58xcR8dYJS5rYvzZ4X1UGLWhl3brRzCM/edit?usp=sharing
Online Tech Tools for Educators - https://docs.google.com/spreadsheets/d/1XNxaa_LJt5PPh9MfIbE9fKvUCnzurM-sKE4wZQkRtRZo/edit?usp=sharing

Tools Created for the Science Methods Course

Moon Phases Guided Exploration – https://marticanipe.files.wordpress.com/2020/05/guidedexploration-moonphases.pdf
Sample Weekly Plan - https://marticanipe.files.wordpress.com/2020/05/weeklyplan.pdf

Enhancing K-12 Pre-Service Teachers' Digital Pedagogical Literacy Lesson Planning for Teaching Online

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Lesson planning is an essential component of teacher professional development. COVID-19 has ushered a rapid transition from classroom based teaching to online engagement with K-12 students placing new demands on teachers to apply their lesson planning skills to new digital classroom environments. This paper presents a rationale for innovation in lesson planning for online teaching. Early results from a pilot project indicate that a Rhythmic Approach to lesson planning translated well to online classrooms and facilitated dialogic interactions between teachers and students. In addition nascent challenges associated with the transition from physical to online classrooms were mitigated. Early results and outcomes are relevant to K-12 preservice teachers, teacher educators and established inservice practitioners.

Keywords: K-12, Lesson Planning, Teaching and Learning, Teaching Online, Pedagogical Literacy, Pre-Service Teacher Education, Teacher Education

INTRODUCTION

Pedagogical literacy can be viewed as the capacity to identify classroom challenges and to develop literature informed responses (MacLellan, 2008). Agile Pedagogical Content Knowledge (PCK) (Shulman, 1986) is often expressed 'on-the-fly' as part of dialogic exchanges between students and inservice teachers. For Pre-Service Teachers (PSTs) developing this capacity, or pedagogical adaptivity (König et al., 2020), as a core practice (Grossman, Hammerness, & McDonald, 2009) is both desirable and daunting. While there is a clear need for structured lesson planning to help PSTs transition into inservice teaching (John, 2006; König et al., 2017), there is also a need for in-lesson flexibility capable of responding to the fluid nature of teaching contexts (Mutton, Hagger, & Burn, 2011). Informed by social constructivism (Dewey, 1988; Vygotsky, 1978), this paper presents a response to this challenge by introducing a Rhythmic Approach to lesson planning in order to facilitate dialogic exchange within online classrooms representative of real-world inservice practice.

INNOVATION

In the physical school setting there is a natural erosion of class time as a consequence of K-12 students transitioning through corridors and into class. Further time constraints are often imposed by external class interruptions and everyday classroom challenges. While some of these challenges are mitigated though a migration to the online space others, such as technical issues, can emerge in their place (Kearsley & Blomeyer, 2004).

As part of pilot phase of a larger design-based research (Barab & Squire, 2004, 2016) project, aiming enhance the digital pedagogical literacy of PSTs in order to support the development of pedagogical adaptivity (König & Kramer, 2016; König et al., 2020), participants were encouraged to adopt a Rhythmic Approach to developing the main body of their lesson plans (Figure 1). The purpose of this approach was fourfold: to address issues of timing in the physical and online classroom; to create ring-fenced teaching time so as to maintain curricular momentum; to create conditions for in-lesson dialogic teacher/student exchange and; to create opportunities to pivot 'on-the-fly' in response to challenges presented by class groups, particularly when teaching online.

A generic lesson plan template, familiar to the PSTs (John, 2006; Petty, 2004), was adapted to include three ring-fenced opportunities for teacher/student engagement in the main body of the plan. Typical rhythms encouraged were 5 or

7 minute periods of teaching time followed up by a 3 or 4 minute break-out room activity depending on the length of the planned lesson. Breakout rooms were set to close automatically and return students to the main room after the required time was up. The rhythmic timings were determined by the typical length of class time (40-60 minutes). Planning for the rhythmic sections presented a secure period of teacher-student engagement between 24-33 minutes excluding in-class correction of pre-work, interruptions and assignment of post-lesson tasks. Finally, PSTs were encouraged to engage with students using various formative assessment strategies to develop a deeper understanding of emergent challenges in the classroom within breakout room deliverables (Vonderwell & Boboc, 2013).

Main Body of lesson			
Rhythm Section 1			
Rhythm: 5/3	**Teacher Activities**	**Student Activities**	**Timing:**
7 min	• Recap of why the Renaissance began in Italy x 4 reasons (LO1) • Introduction to Leonardo de Vinci (LO2)	• Partially complete Cornell Notes Renaissance template (1 of 8) (finish for homework)	4 min 3 min
4 min	• Respond to emergent challenges • Visit breakout rooms 1 & 2	• Respond to question: Why would others want to steal L.d.V.s' ideas? • 2 ideas per B.O. Room typed into chat-box	4 min
Rhythm Section 2			
7 min	• Quick-fire response to student ideas (watch out for misconceptions) • Intro 2 Key L.d.V major works (LO3)	• Partially complete Cornell Notes Renaissance template (2 of 8) (finish for homework)	4 min 3 min
4 min	• Respond to emergent challenges • Visit breakout rooms 3 & 4	• Respond to question: How are these works different to medieval works? • 2 ideas per B.O. Room typed into chat-box	4 min
Rhythm Section 3			
7 min	• Quick-fire response to student ideas • Focus on 2 Key L.d.V techniques (LO4)	• Continue to partially complete Cornell Notes Renaissance template (2 of 8) (finish for homework)	4 min 3 min
4 min	• Respond to emergent challenges • Visit breakout rooms 5 & 6	• Respond to question: Where do you see the use of perspective in your life? • 2 ideas per B.O. Room typed into chat-box	4 min

Figure 1. Example of Rhythmic Approach to lesson planning (European History).

RESULTS

Early results indicate that using a Rhythmic Approach to lesson planning supports the planning of online lessons. Typical timing issues experienced by these novice teachers were mitigated and emergent challenges were considered to be addressable as time had been planned in advance to consider appropriate responses when students were engaged in scheduled tasks (König et al., 2019; Mutton, Hagger, & Burn, 2011; Stigler & Miller, 2018;). It was noted that the introduction of a Rhythmic Approach to the main body of the lesson plan provided opportunities to break down lessons into tasks that were considered manageable and well defined for both teacher and student (Borko, Roberts, & Shavelson, 2008; Kang, 2017) within their scheduled, core teaching time of 24-33 minutes. In some instances an additional rhythmic section was deemed necessary and PSTs adjusted subsequent plans accordingly. In this pilot phase there is some evidence that suggests this may be relevant to specific subjects such as science. Finally, it was evident that including a Rhythmic Approach was advantageous in allowing time, 'on-the-fly', to deal with emergent student needs. This was prompted by dialogic teacher-student exchange and was most evident where students were engaged in online breakout rooms. This facilitated teacher responses with differentiated strategies during live lessons and in post-lesson reflection.

IMPLICATIONS

It is posited here that during a rapid transition to online teaching challenges established teacher education pathways for the development of PCK (Schulman, 1984), typically forged in K-12 face-2-face classrooms, may become disrupted. However, during this period, opportunities to develop strategies and techniques that enhance the digital pedagogical literacy of PSTs and have affordances for future engagement in the physical classroom settings do exist. Here, some practical suggestions and advice on implementing a Rhythmic Approach to lessen planing for teaching online are now offered to teacher educators, pre-service teachers and established in-service practitioners.

Teacher Educators: are very aware of the myriad of challenges that PSTs face (Ceana, 2014; McCulloch, 2011) and the importance of lesson planning in providing much needed scaffolding (John, 2006; Vygotsky, 1978). Taking a Rhythmic Approach to lesson planning can help trainee teachers to learn how to adapt and overcome emergent challenges in both the online and face-2-face settings. Some considerations related to programme integration include:
- Early introduction of the Rhythmic Approach in courses;
- Care should be taken to emphasise to trainee teachers that is okay not to progress to the next section and that in-lesson adaptations are encouraged;
- Encourage the inclusion of short (3min) active learning methodologies within breakout room sessions;
- Particular attention should be paid to communicating the necessity for detailed instruction for participation in breakout room activities.

Adopting a Rhythmic Approach to lesson planning can help student teachers begin to develop the pedagogical adaptivity (König et al., 2020) that experienced practitioners often display.

K-12 Pre-Service Teachers: are continually beset by issues that relate to time management and maintaining curricular momentum across terms with class groups (Conway et al., 2009). Introducing active learning methodologies can, initially, prove challenging when trying deal with emergent class group issues or technical challenges pertinent to teaching online (Mutton, Hagger, & Burn, 2011). The Rhythmic Approach to lesson planning has the potential to mitigate some of these challenges. Advantages to using this approach include:
- Improvements related to in-lesson time management as a consequence of ring-fencing teaching time;
- Maintenance of curricular momentum over the duration of a term;
- Planning for scheduled active learning methodologies within breakout rooms can allow time to solve emergent technical challenges;
- Using a Rhythmic Approach can facilitate an emergent necessity to revisit a concept with students and reset the related breakout room activity;
- The Rhythmic Approach is time-conservative and so it is important to have additional materials and activities in reserve for when things move more rapidly than anticipated.

The Rhythmic Approach to lesson planning has the potential to aid lesson planning for both physical and digital learning environments. Building in time, as the Rhythmic Approach does, by segmenting out teacher and student periods of focus facilitates periods of time for in-lesson reflection in order to address emergent student needs. Many experienced educators do this intuitively (König et al., 2020). This is a stepping stone towards developing that capacity.

Established Inservice Practitioners: often intuitively mitigate emergent classroom challenges, however, even seasoned professionals may need to revisit lesson planning while transitioning to online teaching order to support the PCK (Shulman, 1986) forged through years of experience. Some practical considerations include:

- While the approach presented here is a didactic-to-active combination it can also be used as didactic-to-questioning strategy. This presents an opportunity to employ effective lower to higher order questions (Shahrill, 2013);
- Use the Rhythmic Approach to build in time to solve technical challenges when students are engaged in activities;
- Lesson planning using the Rhythmic Approach presents opportunities to change the course of the lesson 'on-the-fly' should the need arise as might occur in the classroom;
- Encourage students to use the chat functions on the platform being used to communicate challenges that they are experiencing.

Experienced teachers know that there is a need for in-lesson flexibility in order for emergent student needs to met (Mutton, Hagger, & Burn, 2011). The use of the Rhythmic Approach affords such flexibility.

The Rhythmic Approach to lesson planning has the potential for application in both physical and digital learning environments. Perhaps the current situation has presented an opportunity to attend to persistent pedagogical challenges relevant to both contexts that teacher educators, PSTs and established in-service professionals experience whilst we are 'under the pump' to address challenges related to online teaching.

FUTURE RESEARCH

It is intended that next steps will involve, a mainstream sample of PSTs from across the full range of K-12 subject areas will be asked to test this approach to lesson planning to determine the suitability of the approach for widespread integration into PST training programmes. In addition it is intended that the Rhythmic Approach to lesson planning will be shared with experienced inservice teachers to gain a deeper understanding of the effectiveness of this approach in both physical and online classrooms. Future research will include a longitudinal study on the impact of using the Rhythmic Approach to lesson planning on the practice of graduates once they enter inservice practice. Of particular interest will be the impact of this approach on the their pedagogical literacy and the development of their pedagogical adaptivity.

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The Transcendent Power of Remix: Cultivating Creativity, Story, and Student Voice in Online Learning

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In this chapter, the authors share their motivations for cultivating an iterative remix practice in preservice teacher curriculum and instruction media courses. They argue that an overemphasis on technology and devices distracts teachers while also distancing students from higher order thinking as well as authentic and creative learning opportunities. Moving online during Covid-19 further distorted a misplaced focus on tools, undermining the types of creative, student-centered learning that is essential to inspire engagement, curiosity, and meaningful knowledge construction. Through remix, the authors model low-tech practices that are high impact with implications to advance participatory culture, new media literacies, and critical digital pedagogy. The initial findings suggest remix as a fruitful online pedagogy that promotes democratic, student-centered learning and innovation, while also avoiding the pitfalls of a technocentric approach to teaching and learning.

Keywords: remix, creativity, participatory culture, student voice, critical digital pedagogy, new media literacies, educational technology, online learning

INTRODUCTION

Although creativity and community are hailed as indispensable for learning (de Alencar & Oiveira, 2016; Choudhury & Share, 2012; Lille & Romero, 2017; Marqui, Radan, & Liu, 2017; Sotiropoulou-Zormpala, 2012), their presence has been diminished by standardization and rigid assessments in kindergarten through college (Mossman, 2018; Robinson, 2008). In preservice teacher education, the situation is exacerbated by a history of educational technology enmeshed in failures to center students at the heart of instruction (Buckingham, 2013; Collins & Halverson, 2009; Cuban, 1986; Cuban, 2001; Saettler, 1990). A focus on devices, burnished by an ideological belief in the power of technology to advance humankind, thwarts transformative use in education. Moreover, scholars report preservice teachers lack the training and experience required to actualize learning through original content creation (Lei, 2009; Kumar & Vigil, 2011; Domine, 2011). Moving online during Covid-19 further distorted a misplaced focus on tools, undermining the types of creative, student-centered learning that is essential to motivate engagement, curiosity, and authentic knowledge construction. To augment attention to creativity in practice, the authors share how they used remix in curriculum and instruction media courses to model practices relevant to participatory culture (Jenkins, 2009), new media literacies (New London Group, 1996), and critical digital pedagogy (Morris & Stommel, 2018).

INNOVATION

Remix is using cultural artifacts to create new, one-of-a-kind works (Knobel & Lankshear, 2008; Freire & McCarthy, 2010). While traditional remix employs pre-existing cultural artifacts (e.g., popular music, movies, comics, anime, etc.), the authors expanded on this tradition, designing a participatory learning model where students created their own works and then remixed their collective expressions to advance learning. The authors goal was to model low-tech teaching practices that prioritized student voice, instead of devices or teacher-centered instruction. In short, students participated in an

iterative process of making, sharing, and remaking their creative expressions as they related to course content and learning aims. The first example features artifactual literacies (Pahl & Rowsell, 2010) and poetry to study data-mining and the second highlights participatory practices (Jenkins, 2009) for video production. Lessons took place synchronously over Zoom and used simple tools— such as G-Suite documents, folders, and slides. Yet, these types of activities were done face-to-face before Covid-19 and moving online proved seamless for students.

Snapshot 1: Artifactual Literacies, Poetry, and Data-Mining

Students analyzed artifacts to synthesize assigned readings about privacy, data-mining, data-personalization, and surveillance. The lesson began with a scavenger hunt: "Find an object; a simple object that you can share with our class. Don't overthink it." Students scattered from behind their Zoom cameras to find objects. Next, students gifted objects to peers. "Give your object to the classmate on our roster whose name is listed after your own. Hold it up to the camera. Show them. Type its name in the chat." The prompt: "This object has a message for you about privacy, data-mining, data-personalization, or surveillance. Write for eight minutes to reveal the message. What lesson does this object give you?" Students wrote together using a shared document to facilitate an efficient discussion later. Figure 1 shows a sample of student work inspired by a Rubik's cube and written as a poem.

A puzzle that's rarely found whole
Individuality stripped with each twist and turn
The colors of my life lined up in squares
Information used and abused
This object holds the message that I am
nothing more than a person to figure out
They take me in their hands and see all that I see
Warp the things I like to what they want them to be
Greedy fingers marketing the outline of my midst
Trying to solve all that I am, forced to coexist

Figure 1. Student Sample of Work from Artifact Lesson on Privacy in the Digital Age.

After writing, students were invited to read out loud. To promote active listening, other students were prompted to type a representative word into the chat that featured main ideas or key themes from the writing. In response to the poem in Figure 1, students wrote: monetization, consumerism, data-mining, and power imbalance. Together, student writings and representative words were generative and metaphoric, meeting lesson objectives for higher order, critical thinking. The chat provided opportunities for collaborative analysis and conversation about key ideas. Creative expression as formative assessment models how to gauge students' prior knowledge, preconceptions, and misconceptions based on required readings.

Example 2: Participatory Production

To practice video editing and script-writing, students recorded b-roll footage for homework using their phones and uploaded these clips to a shared Google folder. During the next class, they were tasked to create a video from this shared footage. Students collaborated in identifying frames and capturing screenshots to illustrate a cohesive story curated in a set of class slides. Then they wrote voice-overs in the "notes section" to tie the sequence together. The sample of student work in Figure 2 demonstrates technical skills in selecting, trimming, and arranging, as well as narrative skills in denoting connotation via the script.
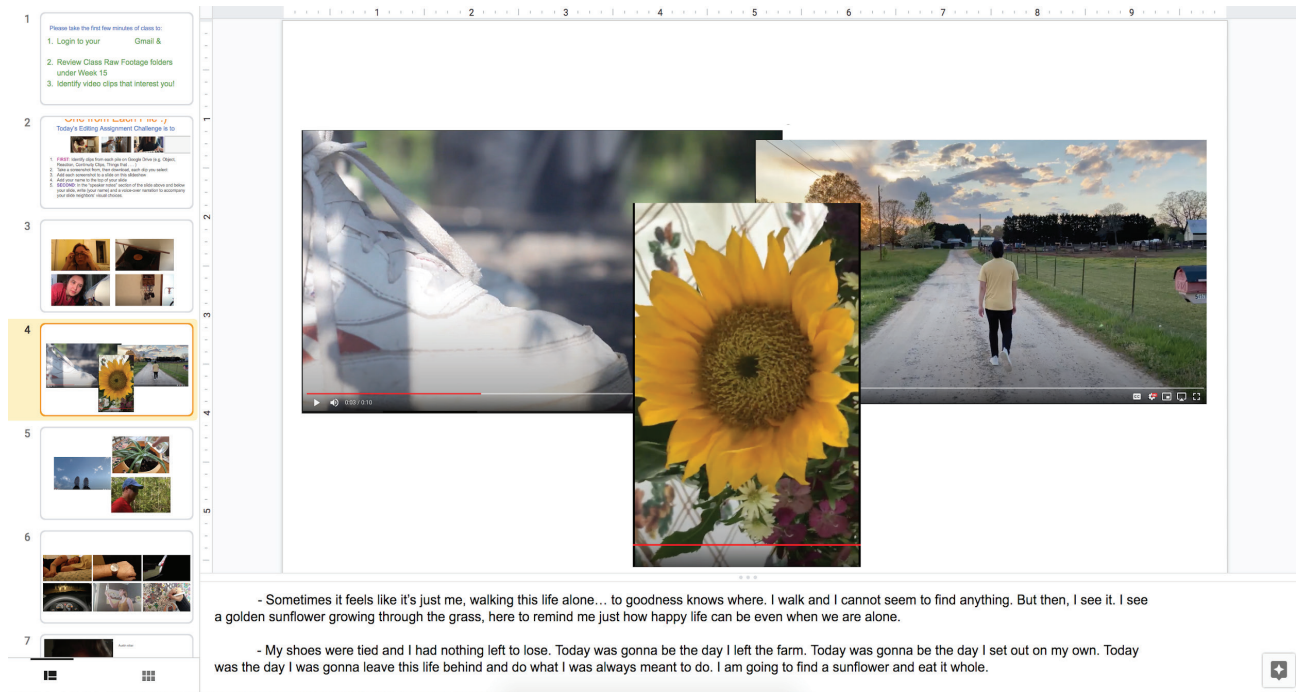
Figure 2. Student Sample of Work from Screenshots and Storytelling.

The instructor observed students' ability to plan video stories that synthesized visuals with narrative text. These skills are readily transferable to the processes of creating materials for teaching and instruction, and facilitating digital storytelling practices to cultivate creative and narrative-based learning.

RESULTS

The authors problematized and improved their teaching (Feldman, 2009; Samaras & Freese, 2009;) and developed a remix learning model that may be adapted for multiple contexts and content areas. Figure 3 provides a glimpse of the model, while Appendix A offers a detailed explanation of the specific goals for each phase.
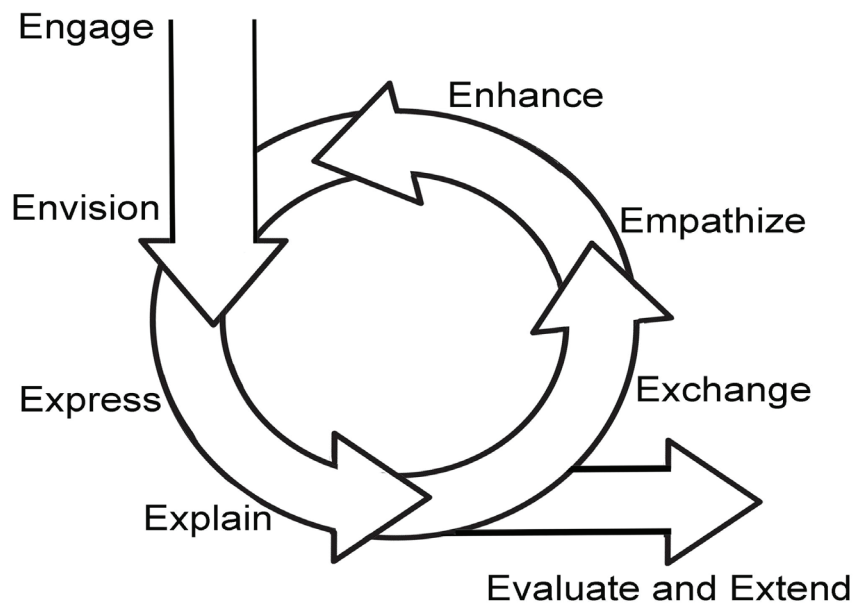
Figure 3. Remix Learning Model.

This research-based model was influenced by arts-based practices (Bryant, 2010; Hetland et al., 2015; Leavy, 2015) and the BSCS 5E Instructional Model from science education (Bybee, 2014) that is widely incorporated into preservice methods courses. Unlike the 5E model, the components of remix are interchangeable, iterative, and inclusive. The phases can be implemented in multiple configurations and repeatedly within a given instructional period or over time, particularly the inner cycle. As an arts-based practice, the workflow facilitates equity by inviting students to actively construct and negotiate knowledge on their terms and as a learning community using open-ended, creative prompts.

IMPLICATIONS

Remix has significance for preservice teacher education programs seeking to effectively incorporate critical digital pedagogy (Morris & Stommel, 2018), as well as benefits for inservice teachers seeking to engage their students in meaningful, low-tech/high-impact learning online during the Covid-19 crisis and into the future. While there are numerous implications, the authors have identified four specific areas that are suited to the scope of this chapter.

Practice is Learner-Centered, Democratic, and Human

Remix is learner-centered, participatory, and democratic because it disrupts the traditional chain of command in teaching and learning—where teachers act as the source of authority and knowledge to collect and judge products of learning. Through remix, learners' ideas, opinions, and perspectives are central and peers collaborate in building deeper knowledge bases. Moreover, these characteristics also make the process *human*. As Jenkins (2009) explains "Interactivity is a property of the technology, while participation is a property of [people]" (p. 8). Sustaining the humanity of educational experiences when they move online demands our steady attention. The incorporation of remix provided students with the opportunity to negotiate content and express knowledge in varied, complex, and active ways that maintained the human spirit of the classroom.

Practice is "Simple, Durable, Flexible and Responsive to Teacher Control"

Effective technology must be "simple, durable, flexible, and responsive to teacher control" (Cuban, 1986; Cuban, 2001) and this is even more vital in online learning. Remix exemplifies these characteristics because it is not reliant on expensive tools or complex technologies, making it adaptable and highly replicable for teachers and students in myriad settings, content areas, and with varying access to technology. Morris and Stommel (2018) explain that all learning today is "necessarily hybrid," referring to the proliferation of web-based tools, LMSs, and other materials that join physical classes with the Internet. Remix harmoniously incorporates the physical and digital worlds of students through simple processes, making it easily transferable and fluid for use in face-to-face, hybrid, and online learning.

Practice Cultivates Complex, Higher Order Thinking

Employing remix mitigates the risk of reducing online learning to a lower-level knowledge transaction (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956) by inviting complex, critical and creative contributions from students. When engaged in remix, students necessarily use higher order thinking skills, such as: preparing, planning, analyzing, solving, rearranging, reconstructing, relating, synthesizing, revising, judging, interpreting, or justifying. Moreover, plagiarism and cheating are non-issues in remix learning because content is original and the class community supports each learner's productions through the rich exchange of ideas and expressions. Learning is evaluated iteratively through active discussions and metacognitive reflections regarding creative choices as they relate to content.

Practice Paves Way for Innovation

Perhaps more than ever, creativity, innovation, and community are essential capacities in preparing students to confront the challenges facing our world. Among these are: climate change, economic disparity, displacement, political polarization, and global pandemic. In *Transforming Our World: The 2030 Agenda for Sustainable Development*, the United Nations (2015) argued substantial investments in education for *innovation* as essential. As a creative pedagogy, remix cultivates not only the mental agility needed to "think outside of the box," but also the confidence to move from standardization to innovation.

FUTURE RESEARCH

Remix offers fruitful opportunities for advancing student engagement, motivation, and higher order thinking fluidly in face-to-face or online settings. Future research is necessary to provide teachers with specific practices to select from in designing learning experiences and curricula. It would be helpful to curate a selection of activities across modalities, along with samples and possible assessments. For interested readers, initial tips are provided in Appendix B. The authors also plan to elicit student perspectives related to remix in order to better understand impacts on learning.

Teacher-scholars seeking to work in this area are encouraged to explore participatory culture (Jenkins, 2009), new media literacies (New London Group, 1996), and critical digital pedagogy (Morris & Stommel, 2018). The authors also recommend the book *Intention: Critical Creativity in the Classroom* by Amy Burval and Dan Ryder (2017) for a general introduction to creative teaching and learning. With an adventurous attitude, the ideas shared in this text may be adapted and digitized for active, online learning. For guidance on evaluation, the authors suggest examining the Creative Thinking VALUE Rubric available online from The Association of American Colleges & Universities (AAC&U).

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Detailed explanation of the specific goals for each phase in the remix learning model.

Engage: The goal of *engage* is to capture students' interest and inspire their curiosity for learning. The teacher piques students' attention and focus through simple, invitational prompts or games related to prior knowledge, readings, or other course materials. As a component of a class or sequence in progress, this phase may comprise check-ins where the teacher affirms progress regarding activities, coursework, or projects. This phase in learning may include prerequisite access to various course materials, readings, viewings, or other content to be remixed during learning. While engaging in course materials, the teacher may encourage students to note key ideas, pull salient quotes, ponder themes, or jot down questions.

Envision: The goal of *envision* is to provide planning time for students to brainstorm and prepare to create their expressions. The teacher may incorporate specific planning tools or prompts to facilitate students' thinking, such as mind maps, sketch notes, or storyboards. The teacher may also provide "creative constraints" (Burvall & Ryder, 2017) to help focus students' energy in planning. Not all expressions require extensive planning or pre-production.

Express: The goal of *express* is to invite authentic, student production of materials and making related to the learning aim or topic. The teacher sets an individual or collaborative task that requires inquiry, reflection, and expression. The task should be hands-on, open-ended, or choice-based and include basic constraints so as to be manageable, accessible, and inclusive for students. The key of the express phase is to empower learners to align learning in personal and reflective ways that are grounded in artifacts and experience, in addition to the content.

Explain: The goal of the *explain* phase is for students to reflect on and articulate the thinking and learning behind their expressions. They may do this through written, oral, or performative methods. A complete explanation conveys how a given expression connects to course content, materials, topics, learning aims, and experiences. They may analyze to determine relationships between content and expression, integrating evidence-based thinking. In addition to content connections, it is important for students to convey the specific creative decisions and choices they made in crafting the expression.

Exchange: The goal of *exchange* is for students to share their expressions and discuss how they negotiated content and creation. Students are invited to discover each other's ideas by sharing perspectives and elaborating on their process. Students deepen knowledge and engage in transfer during this phase, as they identify themes and invite new ways of understanding.

Empathize: The *empathize* phase is highly reflective and largely immersive, occurring throughout the phases, but particularly with the express, explain, and exchange phases. In sharing their work, students access and negotiate the varied perspectives of their peers, cultivating within themselves the capacities to see content and ideas in new ways.

Enhance: The goal of *enhance* is to invite students to recombine, remake, and redirect their expressions or the expressions of their peers in order to further the learning aim or topic, add new knowledge, and generate new questions. As with *expression*, the teacher may offer specific prompts for this phase. When enhancing, students are empowered to negotiate their prior knowledge or the class community's knowledge through personal and community reflection. Explain may be incorporated again following the enhance phase, as the inner circle of phases is largely iterative.

Evaluate and Extend: The goal of *evaluate and extend* is for the teacher and class community to evaluate learning through both critique and affirmation. Students identify and discuss their conceptual understandings as represented by their creative choices throughout the phases, articulating meanings in their work and providing evidence for how their ideas related to learning topics or aims have deepened, refined, or changed. This phase invites students to extend their ideas into other domains or contexts. the teacher may again affirm progress regarding activities, coursework, or projects and set the trajectory for the next learning events. Teachers or peers may offer strengths and suggestions related to process and products so as to elevate learning. The evaluate phase is also iterative and immersive, occurring informally throughout the phases, but featured more completely following the cycle.

Initial tips for designing activities for remix learning.

Pedagogical Characteristics of Remix	Possible Genres for Remix
- Open-ended - Choice-based - Invitational - Personal/Individual - Collaborative/Partner - Metaphoric/Symbolic - Accessible - Minor Constraints	- Visual Arts (traditional/fine art mediums; e.g. pen, paint, sculpture, etc.) - Photography - Film/Video - Cartoons/Comics - Narrative - Non-Fiction - Fiction - Poetry - Music/Sound - Dance/Movement - Physical/Spatial/Artifactual - Theatre/Drama - Popular Media

"Connected" Literacies
Virtual Storybook Reading and Digital Writing During the COVID-19 Pandemic

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This brief chapter details best practices in the shift to elementary-focused digital storybook reading and digital writing and ways to replicate these practices given remote learning contexts in K-12 and higher education. Preservice and inservice teachers can engage in versatile and flexible virtual storybook reading and writing events with elementary or secondary students as part of their teacher education training. Inservice teachers can also use more advanced techniques with read-aloud, shared reading, and digital writing. Activities can be structured to support reading and writing development for K-12 learners via distance learning methods (e.g., a smart phone or video conferencing tool) and use of free highly engaging digital texts and tools. Best practices during COVID-19 included supporting technology needs, detailing methods for storybook reading and digital writing and interaction, curating lists of engaging digital texts, approaches that had a comprehension and meaning-centered focus, and fostering motivation of the learner(s).

Keywords: Literacy; digital writing; virtual tutoring; digital storybooks; digital storytelling; synchronous learning; reading; writing;

INTRODUCTION

Flexible and accessible learning is required in a time of crisis and remote learning contexts. Teachers can use digital and print stories and texts to connect with students and families during a crisis such as the COVID-19 pandemic. Pictures, videos, and hyperlinks are multisensory features that can aid literacy and comprehension (Leu et al., 2015). Students have opportunities to move creatively and with agency when reading or writing in digital spaces (Lankshear & Knobel, 2011). Digital storytelling and reading digital storybooks can involve immersion in diverse media including music, avatars, videoclips, audio clips, photographs, animation, and narratives. Communication in such media allows for nuances and flexibility in the way that a story is told (Kress, 2009; Van Leeuwen, 2005). Multimedia formats provide opportunities to build literacy skills (Alexander, 2017; Kress, 2003) and comprehension (Van Kleek, 2008) while communicating complex emotions within narratives (Castleden et al., 2013; Smeda et al., 2014). All the authors are familiar with such digital literacy-focused approaches.

INNOVATION: SETTING UP INITIAL STRUCTURE FOR DIGITAL READING AND WRITING

After the COVID-19 shut down began in early March 2020, the service learning component in the first author's literacy methods course, which was an entirely face-to-face course, quickly moved to a 100% online mode. Although some students were already doing virtual storybook reading, it became apparent that all students would need to shift to

digital storybook reading and writing for literacy-focused service learning. This section describes steps taken by the first author with her graduate literacy courses to incorporate digital storytelling and digital writing during the Spring semester of 2020 as the pandemic unfolded. Additionally, the second and third authors incorporated real time literacy experiences into their courses. Video conferencing software such as Facetime, Skype, or Zoom enabled students to participate in the experiences. Students were encouraged to choose whatever software they were most comfortable using because the instructor would not be able to provide more than the most basic technology support. Similarly, students in the first author's course used whatever virtual tool was accessible to them and their elementary student(s).

Here we provide general advice toward the implementation of digital storybook reading and digital writing, based on the three instructors' courses. The first step in reading virtual storybooks to children was selecting a platform. Multiple digital platforms promote reading and storytelling, including phones, e-books and recorded multimedia stories, allowing stories to be read or created in versatile ways. Students were encouraged to use any physical books on hand and provided with a list of e-books across a variety of genres where the screen is shared to show the text. Virtual literacy experiences can build on traditional oral literacies such as storytelling and singing. Digital copies of books can be accessed from websites or libraries. In addition to virtual reading, we also suggest including student engagement in digital writing. In writing stories digitally, the learner can put their ideas into story form without worrying about erasures or misspelled words. For instance, one course required preservice teachers to write a story about a person whom they admire. They included their own images. Often the focus was a family member or friend. They could narrate the story as well as write it and were able to share their stories with family, friends, and classmates.

RESULTS

Preliminary examination of the structure and logistics of the virtual storybook reading shows it is a good idea to start with simple digital literacy tasks. Results were promising in demonstrating how versatile and agile digital literacy experiences can be when used in crisis times. Because K-12 students were also in lockdown and home-bound mode, the project became a "win-win" scenario for fostering literacy development remotely. A challenge became locating quality story resources and structured digital storybook lesson ideas for preservice teachers. Many publishers were easing access to free ebooks. Public domain texts found online (e.g., fables, fairy tales, and older texts) were also used. There was a need to provide preservice teachers with demonstration tutorials on how to "do" virtual read aloud and how to foster interaction. Lesson ideas for virtual storybook reading are needed in our field as more of us teach online. Considerations for digital reading and writing include the student attention span and the overall quality of the audio and video experience.

IMPLICATIONS

Step one for replication is to determine what resources are needed to provide a successful and realistic learner-centered experience.

Curation of Content

1. Begin by curating a list of engaging but free digital content and resources: locate the physical and/or digital text(s) and genres you wish to read or write with students or have preservice teachers use.
2. Curate these on a Google Doc or other cloud-based resource.

Structure the Storybook Reading Experience

3. Create directions for preservice teachers and directions for the K12 students on the "other side of the screen".
4. Consider ways to visually display the text (print or digital) so the pictures are visible for younger readers. For older readers your face should be visible for connectedness, personalization, modeling fluency and expression, and for making eye contact with students.
5. Draw on ideas from face to face settings such as interaction, dialogue, pausing to discuss ideas and elicit reader response and building on the idea of "comprehension as conversation" in engaging with text.

6. Encourage students to locate their own digital books for independent reading beyond the shared virtual reading experience and apps and digital texts for families to use, e.g., Gregory (2004) recommends the value of siblings reading to siblings. The mobile app epic! (https://www.getepic.com/) was used to access free books as were free digital storybooks from public library websites, for example, Overdrive (https://www.overdrive.com/).

Foster Digital Writing and Storytelling

7. For starting digital writing, locate the app or tool (e.g., Google Doc). There are many websites and apps that facilitate digital story writing. Students can include their own images and personalize their stories which is motivating for them. We suggest that shared writing experiences through apps can take the form of photo essays. Stories can be a tool for learning to continue and for reflection and appreciation of humanity to take place during these challenging times.
8. Building on the idea that expressive writing can be healing (Pennebaker & Evans, 2014), encourage students to also record a journal or diary during the pandemic that they can later read or revise. This can include short memos of daily life, thoughts, poems, stories, information, and more.

There are many websites and apps that facilitate digital story writing. Below, we share ones we find useful:

● A favorite is http://www.storyjumper.com. It allows students to add images, text, and voiceover to create their story. They can write several free stories before having to pay for an account.

● Students can write solo or collaborate with peers on stories by using Google Doc or Google Slides within Google Drive. Teachers can give feedback using comments.

CAVEATS AND CONSIDERATIONS

Barriers exist to the effective implementation of digital storytelling and digital storybook reading during a pandemic. Once classes were moved online, many students in the United States lacked adequate access to information and communication technologies (ICT's) that are so vital in online instruction. The Pew Research Center (2019) found that in households with a total annual income of under $30,000, only 56 percent of adults have access to broadband internet. Meeting the needs of students with disabilities is a challenge. Given that assistive technology tends to consist of hardware such as braille readers, mouth sticks, and screen readers, schools need to be creative to ensure that digital storytelling and writing activities accommodate the needs of students with disabilities. Copyright laws should be explained so students are aware that if they do a live storybook reading event, they need to be cautious of legal issues with copyright. A final caveat is to consider ways to make storybook reading accessible via video, such as using closed captioning for students who are hearing impaired or learning English.

FUTURE RESEARCH

Researchers can examine the ways current inservice teachers approach digital storybook reading and writing during the COVID-19 shutdown as a future research project. Additionally, study of the ways that modeling and scaffolding support preservice teachers' implementation of such practices is needed to better support and structure the experience given the limitations of digital reading and writing. A focus on scaffolding leads in the promising direction of seeking to understand the process of transferring responsibility from the teacher to the learner in online settings, and how this influences student cognitive and emotional meaning-making during the pandemic. Scholars can examine ways that scaffolding moves might foster student coping skills, motivation, and confidence during the pandemic. Finally, research is needed into ways of meeting the needs of students who lack ready access to technology and meeting the needs of students with disabilities.

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APPENDIX: MODELING RECORDING DIGITAL STORYBOOK READING (PRESERVICE AND INSERVICE TEACHERS)

The instructor can model for preservice teachers the reading of public domain or royalty free quality texts so students can make their own pre-recorded video as an asynchronous way to share literacy with K-12 students. The following video is available at: https://www.youtube.com/watch?v=0xKRjh6Z8Hc. The video description reads, "Reading classic poems through the COVID 19 pandemic to take our minds of things."
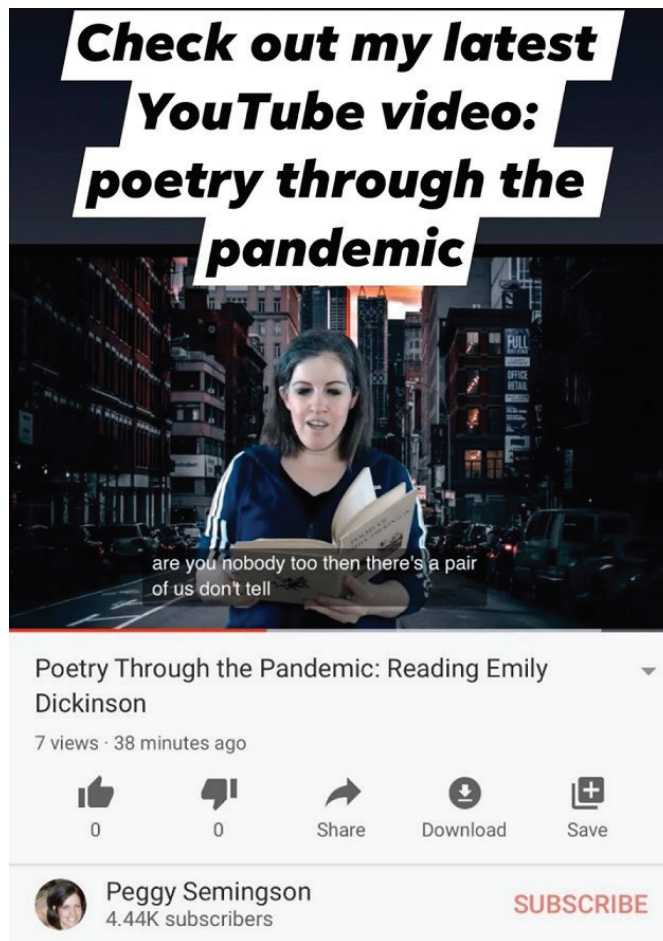
Video Conferencing to Support Online Teaching and Learning

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At the COVID-19 pandemic impacts on schools and universities, these institutions are drawing on video conferencing technologies as a safe alternative to support teaching and learning. This article draws on publications by the author and other literature as well as recent practice to provide processes and strategies to support online teaching and learning via video conferencing technologies. Using a Community of Inquiry framework, the article highlights the benefits of using video conferencing focusing on social presence, cognitive presence and teaching presence.

INTRODUCTION

The use of video conferencing to support teaching and learning is becoming increasingly possible with many young people and adults owning computers or mobile devices that can support video and audio connections. According to Themelis and Sime (2020), video conferencing (VC) can assist online learning and teaching through supporting, watching, and interacting with teachers and learners from anywhere. Interactions via VC can be both informal and formal. Informal online interactions have been shown to help lecturers and students "establish better social relationships with their instructor and classmates" (Contreras-Castillo, Favela, Perez-Fragoso, & Santamaria-del-Angel, 2004, p. 164).

This chapter focuses on two different projects undertaken. One of these involved children in a hospital ward and classroom where, due to sickness, students were unable to travel and thus, the use of VC provided opportunities to learn a variety of topics. The second project involved working with pre-service teachers (PSTs) using video conferencing as a result of them being unable to physically attend university due to the COVID-19 lockdown. These two projects illustrate how VC can be used to support teaching and learning for children and adults, and how VC can be used in small and large group settings.

Community of inquiry framework

The theoretical framework used to understand online interactions supporting teaching and learning is the Community of Inquiry (CoI) model, which consists of three key elements: Social Presence, Cognitive Presence and Teaching Presence (Garrison, Anderson, & Archer, 2000). It is the interactions of all three elements of the model that produce the educational experience for participants as illustrated in figure 1.
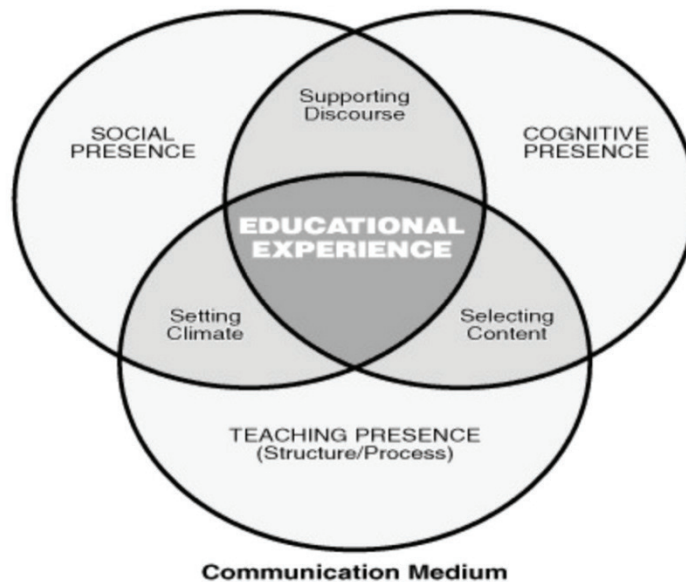
Figure 1. The community of inquiry model (Garrison et al., 2000).

Drawing on the model, Social Presence is defined as the ability of participants to project their personal characteristics, thus presenting themselves as real people. Cognitive Presence is the "extent to which the participants in any particular configuration … are able to construct meaning through sustained communication" (Garrison et al., 2000, p. 89). Teaching Presence consists of the design of the educational experience, as well as facilitation for the purpose of constructing meaningful and worthwhile knowledge (Garrison et al., 2000).

INNOVATION

The two projects have been undertaken by the author examining the use of VC are drawn upon for this chapter. For the first project, VC was used to support lessons for primary school aged students in an Australian children's hospital, both in the hospital classroom and on a ward. There were two classroom lessons organised where the students were connected via Skype. In the first lesson, which was the science lesson, there was one student on the ward and three students in the classroom. In the second lesson, which was the dental lesson, there was a student on a ward and seven students in the hospital classroom with a teacher. These two groups were connected in a multi-video connection to a dental assistant at a dental surgery. An iPad connected to 3G had been provided to the assistant so that she could talk with the students, show them the surgery and then show them how to clean their teeth. The students had a dental pack to support the lesson.

In the second project, VC was used at an Australian university with third year undergraduate pre-service teachers (PSTs) around the age of 21 years old. The focus of the subject was on the use of digital technologies. Initially, the tutorials were run face-to-face at the university, but as COVID-19 restrictions came in, the tutorials went completely online. There were five tutorial groups running with approximately 25 PSTs in each group. The tutorials went for three hours each week and there were six tutorials run for each group. The tutorials were supported by the university Learning Management System.

The process used to understand practices was underpinned by a qualitative methodological approach (Lincoln & Guba, 1985), embracing and understanding the contextual influences (i.e. physical and structural settings, social context – participants' backgrounds, experiences, etc.) (Hennink, Hutter, & Bailey, 2011). The methods used included participant observation and informal interviews. Participant observation, as defined by Mulhall (2003), focuses on the observer "who undertakes prolonged observation, is involved in all the central activities of the organization, and whose role is known" (p. 308). The use of informal interviews, allows for discussion to probe emerging issues, and ask questions about unusual events in a naturalistic manner (Reeves, Kuper, & Hodges, 2008). In the context of the university setting, such discussions are useful as they can inform further practice.

The use of VC was found to successfully support teaching and learning across the two projects. In the hospital project, students were able to connect with each other via VC for informal interactions (Social Presence), such as playing games, which were important precursors to formal learning. These games also helped to ensure the mental health of students was supported, where isolation on wards can have negative impacts. This presence is very important for students in hospitals confined to wards or to their homes, which can include sick students or self-isolated students.

In working with the hospital school students, the use of VC allowed students to experience authentic settings (dental clinic) that they would not normally have access to because of safety issues. The students were able to interact with experts in the field, in this instance the dental assistant (Teacher Presence). Additionally, it was found that the role of the teacher changed where experts supported the process. Teachers acted as facilitators mediating the interactions of the experts online and with the students (Maher, 2015). The teacher also provided prompts and scaffolds to assist the students' learning.

Cognitive presence was realised for the ward student through providing him with the same resources that the students in the class has access to (see figure 2). The student was able to communicate with the class teacher to ask questions and to clarify processors and procedures.

Figure 2. Resources used for science lesson.

In the university setting, using VC allowed PSTs to interact with each other as a large group and in small groups analogous with the process that would be undertaken in a face-to-face class. Students were able to work with the lecturer where explicit instruction was provided for the whole group as well as one-to-one discussions (Teacher Presence). The use of break-out rooms via Zoom allowed for students to interact and share in pairs (Social Presence). This peer connectivity is as important for university students as it is for school students, particularly in time like the COVID-19 where there is a lot of uncertainty.

The sessions were organised so that the PSTs presented in pairs at the beginning of each session which allowed for them to experience teaching using a VC medium. At that stage it was unclear when school students would return to schools so this experience provided an opportunity to experience the use of VC to support teaching. A Learner Management System used in conjunction with the VC system allowed students to access information prior to the tutorials and the use of Google Slides, via Google Classroom enabled them to document their ideas in groups during the tutorials, which could then be shared with the whole group (Cognitive Presence).

IMPLICATIONS

One of the important findings to come out of the two projects was around the role of the teacher. When running online lessons, it is possible, and to some extent easier compared to face-to-face lessons, to involve an external expert who can provide focused information. Through the use of video conferencing "students hear things from 'the horse's mouth' and can respond immediately with their own questions" (Comber et al., 2004, p. 8). The implication of having experts support some of the teaching is that the role of the teacher changes to become one of facilitation, mediating the interac-

tions of the experts online and with the students. The teacher also provides prompts and scaffolds to assist the students' learning. Pedagogical practices, such as breakout sessions, where students can chat in groups with the teacher moving from group to group using tools such as Zoom or Skype can allow for more collaborative opportunities, thereby enhancing teacher presence (Maher & Prescott, 2017).

As was illustrated in the hospital project, through the use of mobile technologies, students can experience authentic locations and interact with authentic people, thus facilitating authentic learning, which Collins (1998) defines as "the notion of learning knowledge and skills in contexts that reflect the way they will be used in real life" (p. 2). Authentic learning has the following features:

1. Provide authentic contexts that reflect the way knowledge will be used in real life
2. Provide authentic links
3. Provide access to expert performances and modeling of processes
4. Provide multiple roles and perspectives
5. Support collaborative construction of knowledge
6. Promote reflection to enable abstractions to be formed
7. Promote articulation to enable tacit knowledge to be made explicit
8. Provide coaching and scaffolding by the teacher at critical times
9. Provide for authentic assessment of learning within the tasks. (Herrington & Oliver, 2000, p. 25)

In relation to authentic locations, these might include places that are prohibited due to being dangerous. These locations might also be overseas or at other locations far away. Experiences provided might be for students learning another language where they can virtually visit an overseas location whilst communicating with a native speaker where they can ask questions. This helps build their language competency and knowledge of the country.

Learning online via VC can also provide students authentic links to audiences. While a student's audience may initially consist of peers and the teacher, this audience has the potential to develop beyond these immediate links (Richardson, 2005). "Other audiences can include relatives of the students, from the immediate family to grandparents, cousins etc." (Maher, 2014, p. 129). The role of experts as highlighted in this chapter can also be drawn upon as authentic audiences. In the instance of PSTs, VC can be used to observe classroom lessons in situ where there is the opportunity to talk with teachers about their practice afterwards.

Social interactions are an important part of learning. During the normal day people have breaks, move around and have opportunities to social interact. It is important therefore, that students have the opportunity to interact with each socially online. This concept is supported by Cummings, Butler and Kraut (2002) who state: "The evidence is clear that interpersonal communication is an important use of the Internet, if not its most important use" (p. 103). This can be achieved, as was the case in the university project, by providing break out rooms, where students are in small groups. In the hospital project, it was realised by providing games for students to share. Some examples of types of games that might be provided are illustrated in table 1:

Table 1
Categories and Game Sites

Category of game	site
Puzzles	digipuzzle.net
Puzzles	onlinejigsawpuzzles.net
Puzzles	cbeebies.com
Board games	tabletopia.com
Board games	arkadium.com
Board games	pogo.com
Sports	learn4good.com
Sports	thekidzpage.com
Sport	gamekidgame.com
Action	safekidgames.com
Action	gamesgames.com/games/action
Action	Nick.com.au

Social interactions are particularly important for students in hospitals confined to wards or to their homes, which can include sick students or self-isolated students. As suggested by Onken Dumont, Ridgway, Dornan and Ralph (2002), recovery involves a social dimension - a core of social relationships by being connected with peers. If students are isolated but can participate cognitively assigning a buddy partner in the class to manage a device connected to VC software enables them to participate both socially as well as for content-related purposes. In the case of schools, the mobile device might be taken out at recess or lunch, which would help to facilitate this process. Importantly, if operating in a blended environment, if possible, meet face-to-face before moving to an online environment as this will positively impact on social presence.

In going online with the PSTs it was clear that they had limited experience in interacting online using Zoom. One of the strategies that was found to be useful early on was to provide opportunities for the PSTs to practise using Zoom where they got to explore the different features. This not only supported their content knowledge of the subject (Teacher Presence) but provided opportunities to develop skills and knowledge in using VC software such as Zoom. For the teaching staff, using Zoom with 30 people was a new experience and taking advantage of professional learning opportunities provided by the university helped to develop skills.

As the move from face-to-face tutorials to online tutorials was unexpected, a list of online resources was provided to students through which they might communicate with other class members (which some students took up) as shown in table 2:

Table 2
Resources Provided to Students

Name of product	Type of product
Skype	VC software
Adobe Connect	VC software
Google Hangouts	VC software
Kahoot	Game-based platform
Socrative	Game-based platform
Aha slides	Game-based platform
Quizizz	Game-based platform
Poll Everywhere	Polling platform
Direct Poll	Polling platform
Slido	Polling platform
Mentimeter	Polling platform

One of the impacts of interacting with PSTs online for an extended period was that they got what is known as Zoom fatigue. This is caused as the cues that normally support interactions can be absent such as if a person is framed only from the shoulders up, where viewing hand gestures or other body language is eliminated (Sklar, 2020). Gaps between interactions tend to be longer which also adds fatigue. It was found that having breaks in the tutorial helped to diminish the effects of Zoom fatigue.

FUTURE RESEARCH

Much of the research undertaken on VC has focused on planned use to support teaching and learning. There has been very little research in how VC has been implemented through unexpected circumstances such as the COVID-19. This chapter has touched on this briefly, but there needs to be a greater focus of this in the literature. Another aspect focused on in this chapter is the use pf VC to support children in hospitals. To date, there is limited research focusing on how VC can support sick or immobilised children and adults. The focus of the work in this chapter has been on native speaking participants. There has been limited research exploring the needs on English as Second Language (ESL)

students. Considering that many students have access to VC technology via phones, this aspect could provide important information. Another area focused on in this chapter was around the aspect of fatigue when video conferencing. There is limited research in this area and considering that VC is becoming more commonplace in schools and universities, this is an area needing more research.

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Experiential Learning Through Video Observations

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Experiential learning opportunities in public school settings for first-semester teacher candidates (TCs) discontinued with the closing of public schools during the COVID-19 Pandemic crisis. In order to offer a rigorous experience for first-semester TCs in the areas of effective tools and techniques for teaching English learners (ELs), an alternative pathway was devised to connect theory with practice. We continued to afford first-semester TCs opportunities to observe and reflect on tools and techniques helping ELs learn grade level content through the use of classroom videos and observation forms. Additionally, to continue opportunities for TCs to understand what ELs experience during their acculturation process in the U.S., TCs they watched the documentary film, "*I Learn America*" and complete viewing guide reflections.

INTRODUCTION

When public schools closed due to the COVID-19 Pandemic, teacher candidates (TCs) in our ESOL methods course, needed alternative experiential learning plans. A course goal is to prepare all (TCs) to work with English learners (ELs) by providing a connection between theory and classroom teaching. TCs need to be equipped to meet EL cultural and linguistic needs (Pappamihiel, 2007). It is imperative to teach TCs research based, theory-to-practice tools and techniques (TTT) that teach language and content (de Jong & Harper, 2005; Nutta et al., 2014; Nutta et al., 2018). TCs need to be linked to expert teachers to better learn how to apply TTT (de Jong et al., 2013; Shulman, 2016). To continue to provide excellent undergraduate education programs, in spite of COVID-19, we revised experiential learning to include immersive learning through video observations of classroom teachers teaching ELs; intense noticing with an observational form; reflections; a cultural film with reflection questions, and two key assignments (Hougan et al., 2018).

INNOVATION

The World Languages TESOL program at our university historically placed first-semester TCs in K-12 school settings to learn from classroom teachers teaching ELs. With that option off the table, our alternative plan for TCs to learn from classroom teachers was viewing videos of teachers teaching ELs. When viewing the videos, TCs identified TTT noticed from their instruction in the ESOL Methods course. This option is viable because research supports the strength of TCs learning TTT for future ELs by observing videos of accomplished teachers (Hougan et al., 2018). While observing these videos, TCs unpack and analyze appropriate TTT used by classroom teachers because they can slow down or pause the video to reflect about what they see (Santagata et al., 2007). Because instructors choose videos that highlight relevant TTT, TCs have the opportunity to see TTT maybe not otherwise observable in service learning experiences (Abell et al., 1996; Wang & Hartley, 2003). These viewing experiences are rooted in social cognitive theory which states that individuals learn from people engaging in targeted behaviors through live or media sources (Bandura, 1977; Lim, 2015; Miller, 2002).

Videos were chosen from Colorín Colorado, a national website serving educators of K-12 Els (see https://www.colorincolorado.org/video). The 30 videos include various topics (e.g., answering guided questions; key academic vocabulary instruction; interactive reading; using realia; teacher commentaries). TCs used an observation form to track TTT noticed in the videos demonstrating classroom teachers assisting ELs. The TTT connected to their ESOL methods course

and assigned textbook, "*Show, Tell, Build*" (Nutta, et al, 2018). The observation form provides a place to analyze written lesson plans taught in the video with the Academic Subjects Protocol (ASP), a lesson planning tool adapting mainstream lessons to English learners' proficiency levels; field notes section; codes for TTT noticed; and, reflection questions to analyze TTT viewed (Nutta et al., 2014). Using this observation form enabled TCs to notice targeted TTT as they observed interactions between the classroom teacher and ELs (Sherin et al., 2008).

A key assignment was a modified K-12 lesson plan using the ASP. TCs apply TTT appropriately in a content lesson by modifying instruction for each English proficiency level (e.g., beginner, intermediate, advanced). Instructors give **feedback** adding value to TC's ability to modify instruction for ELs.

Another key assignment is a cultural immersion project. Previously TCs observed an EL in a K-12 classroom. Alternatively, TCs watched the documentary film, "*I Learn America*," and completed reflection questions provided by "*I Learn America*". This film portrays the language learning and acculturation experiences of ELs who moved to the U.S. TCs completed a culture immersion project based on an ELs in the film.

RESULTS

TCs displayed their ability to recognize TTT necessary for ELs. The observation form was effective for helping TCs to notice valuable TTT necessary to help ELs. However, coding was tedious for the undergraduates. The Colorín Colorado videos proved valuable because they included teachers using TTT with ELs at various English proficiency levels.

"*I Learn America*" was beneficial for TCs to learn what ELs might face entering U.S. schools. TCs expressed in assignment comments how engaging and enlightening the film was, showing ELs' acculturation and language learning process. TCs acquired valuable cultural information assisting them to learn about their future ELs. These preliminary claims are based on grading the two key assignments (Cultural Immersion Project and Lesson Plan Modification table). During pre-COVID-19 classroom discussions, TCs reported not observing their service learning mentor teacher using TTT taught in their ESOL methods course. This circumstance has been substantiated by other TCs in research (Durgunoglu & Hughes, 2010).

IMPLICATIONS

When experiential learning cannot be offered in a K-12 school setting, a main goal of a university teacher education program is still to prepare TCs to teach ELs. The connection between theory and future practice to meet EL cultural and language learning needs must be established, noticed, connected, scaffolded, and applied (de Jong & Harper, 2005; de Jong et al., 2013; Nutta et al., 2014; Pappamihiel, 2007; Shulman, 2016). These elements are best offered when TCs are linked to expert teachers (e.g., through video observations or classroom experiences) demonstrating effective, research based TTT proven to help ELs learn necessary language to learn K-12 content (Bandura, 1977; de Jong et al., 2013; Shulman, 2016;). Therefore, to maintain rigorous university goals, video sources used must be **prescriptive** to **notice** and **connect** TTT taught in theory courses (Hougan et al., 2018). Specific, guided **noticing** is essential for TCs when viewing classroom teachers through video (Sherin et al., 2009). Providing a guide to aide TCs while viewing will increase their ability to make viable connections between theory, classroom teaching, and future teaching practice (Hougan et al., 2018). The observation form is a tool which provides opportunity to focus on noticing specific TTT when teaching ELs.

To advance **scaffolded** experiences, TCs benefit from accessing **expert teacher thinking** and **decision-making** about instructional content, lesson goals, and rationale for chosen TTT (Hougan, 2018). Video commentaries from expert teachers' thinking about teaching strengthens connections TCs make between theory and practice (Hougan et al., 2018). Therefore, when choosing videos for observation, the course instructor should include videos with commentaries of the classroom teacher. Videos in the Colorín Colorado website included teacher commentaries, as well as other materials that assisted TCs with noticing (e.g., lesson plans; standards covered; lesson plan materials; EL strategies; teacher's reflection). Further **expert thinking** advice can be offered by **feedback** from the course instructor when grading key assignments, which was included our experiential learning plan.

Post-viewing video **reflections** are beneficial for TCs (Rosaen et al., 2011). Teacher lesson reflection is a skill TCs should acquire (Hougan et al., 2018) The observation form provides a focused reflection section for TCs to reflect on

TTT for their future practice; the effectiveness of the TTT; ELs' response to TTT; and, additional TTT that could be used in the lesson. The observation form demonstrated to be an effective tool for noticing and reflecting.

A post-viewing **discussion** between TCs or between TCs and the course instructor can reinforce future expert thinking. The discussion should include TCs' shared viewing, noticing, reflections, and experiences (Lambdinet et al., 1997; Santagata & Guarino, 2011). Hence, a discussion assignment would be a valuable addition to the experiential learning plan.

FUTURE RESEARCH

Moving forward, we will use classroom videos to include Colorín Colorado films (see link in References). To link TCs to expert teachers, we are adding materials created via an Office of English Language Acquisition (OELA) grant awarded to our university (e.g., Micro-credentialing of English Learner Teaching Skills (MELTS) modules, digests written by ESOL experts, videos of teachers teaching ELs [see link provided in References-soon to be released to the public]). We will partner with Teachlive, an interactive simulation practice, for TC's to practice TTT included in the MELTs modules, which includes coaching provided by EL experts (see Teachlive link in References). We will continue to use the "*I Learn America*" film when discussing acculturation of ELs in U.S. schools in conjunction with our required Cultural Immersion Project (see Appendix A).

We will continue to use the observation form, although without the codes for undergraduates (see observation form in Appendix B). The noticing and reflecting will help TCs plan their Lesson Plan Modification assignment incorporating appropriate TTT for ELs at their English proficiency levels according to our textbooks "*Educating English Learners*" and "*Show Tell Build*" and the companion website www.englishlearnerachievement.com (see coding scheme in Appendix C, Lesson Plan Modification assignment and Lesson plan table in Appendix D, and textbook links in References). We will continue to offer expert thinking through feedback offered when grading key assignments. A discussion assignment will be added through zoom breakout rooms for TCs to share their video viewing experiences.

Our team efforts maintained expected rigor and excellence of our university, and met objectives necessary for first-semester TCs learning to teach ELs. Colleague collaboration resulted in alternative pathways for TCs to complete experiential learning. All-in-all, in the face of adversity, we became a part of solutions that sustained hope in the midst of crisis.

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APPENDIX A

CULTURAL IMMERSION PROJECT

This project is based on your video observations from "I Learn America."

Your project must be submitted as a Word document; it must be titled (Cultural Immersion project). To complete this project, you will use the assignment template provided in the Module. Please review the rubric for this assignment. Format your paper as outlined below.

Outline details (Do not copy these into your assignment)

Use the provided Cultural Immersion Project Template

Part I: Reflection (60 points total)

Read the instructions for retrieving video:

Watch "I Learn America" video (1hr 30 min long) (Available through the university library)

After viewing the film, elaborate on the following questions:

1. How did the students at International High make the school theirs?
2. What impact do you think the students' embracing of the school has on the way they see themselves as newcomers to the United States?
3. How do you think their attitude impacts their chances of success in this country?
4. One way in which schools build a community is through common school events, such as café night, the prom, and graduation. What rituals did you notice in the film?
5. How does the prom build a positive school culture?
6. What are some of the challenges to building a community through a prom?

Part II: ELL Characteristics (10 points total)

Select one student from the film "I Learn America."

Examine ELL characteristics discussed in this course and your readings (Educating English Learners). Record as much as you can about an EL you observed in "I Learn America."

1. Age:
2. Motivation/Attitude:
3. English Language Proficiency Level:
4. L1:
5. Family Dynamics:
6. How long the ELL has been in the US:
7. Subject areas strengths/weaknesses:
8. Participation in group work:
9. Gaps:
10. Support available to this ELL at school:

Part III: Focus on Culture (230 points total)

Research the culture of that ELL's country of origin. For example, if an ELL you selected from the film is from Pakistan, you will be exploring the elements of Pakistan culture. Your project will include the following culture elements of the EL student's country of origin:

Introduction paragraph (20 points):

Include the name of the country, geographical location, language spoken.

Language/Linguistics (60 points total)

Discuss the following aspects of language/linguistics that are important for teachers to know (i.e. the presence of grammar rules in English that do not exist in the ELL student's L1 or vice versa, or the presence/absence of certain sounds in one language but not in the other). Elaborate on the following:

1. Direction of language: Does she/he read from left to right, right to left, other? (10 points)
2. Alphabet: What type of alphabet does this language use? (10 points)
3. Phonology: What are some pronunciation differences that may pose challenges? (10 points)
4. Grammar: What rules are very different from English grammar? (10 points)
5. Syntax: What type of sentence structure (such as subject and verb order) does this language have? (10 points)
6. Morphology: How does this language make plurals, past tense, etc.? (10 points)

Educational System (40 points total):

1. Identify aspects of the educational system in EL's country of origin or his/her parents' native country. What are the parental expectations based on their native country's educational system? Which of these expectations might cause conflict in the school system in the United States? (10 points)
2. Duration of schooling in the ELL's native country: Is education free? How long are the students expected to attend school in their country? Is it mandatory to go to school? Are both boys and girls encouraged to finish school? (10 points)
3. Research attitude towards plagiarism in the EL's native country. Discuss how a teacher in the U.S. school can address this issue and help ELLs from that country succeed academically. (10 points)
4. Expectations for learning in the EL's country of origin: Are students in that country encouraged to interact with each other or are they supposed to listen in order to learn? What types of testing are common in the EL's native country? Is homework common? (10 points)

Home Life (40 points total):

1. Identify the EL's native country's home life aspects which may lead to problems in school acculturation and success in the U.S. schools. In what particular areas does the teacher need to be sensitive and aware? Ex: Do the students in that country have any specific dietary needs that the teacher should know about because it may affect the interaction of the student in the U.S. school classroom? (i.e. no pork, student fasting, etc.) (10 points)
2. Religious practices in the EL's country of origin and how these may affect the EL's performance in the U.S. school (10 points)
3. Gender roles in the EL's native country(10 points)
4. Family views on education in the EL's country of origin (10 points)

Time and Space (10 points total)

   Discuss the following:

1. How important is punctuality in the EL's native country?
2. How much space are people accustomed to in the EL's country of origin?

Student Behaviors (20 points total):

1. Based on your research of the EL's country of origin, identify EL's student behaviors which may be exhibited in the classroom. Which ones may lead to miscommunication or misunderstandings in the school system in the United States (gestures, eye contact, manner of dress that are appropriate in the student's home culture, other)? (10 points)
2. What strategies would be beneficial in working with these ELs in schools in the United States? (10 points)

Reflection on possible biases (20 points):

Using your knowledge from the "Hidden biases" workshop, reflect on the following prompt about the EL students from the country you researched in this project:

What are the areas of difference between the EL students and yourself that could potentially trigger bias, either consciously or subconsciously, in your interactions?

Works Cited (20 points):

Minimum 5 sources

As you are researching the culture elements of the EL student's native country, check several reliable Internet resources (**Wikipedia is not a reliable resource**). Attention: **Direct quotes are not allowed in this report.** Make sure to paraphrase sources correctly.

Important: When speaking of a culture's attitudes, values, perceptions and behaviors it is important to **use general terms** (such as, **"it appears many prefer," "may," "in most situations," or other phrases**) to prevent stereotyping the culture and to prevent ignoring individual differences that exist in all cultures.

CULTURAL IMMERSION PROJECT

Part I: Reflection

(A)

1.

2.

3.

4.

5.

6.

Part II: ELL Characteristics

1. Age:
2. Motivation/Attitude:
3. English Language Proficiency Level:
4. L1:
5. Family Dynamics:
6. How long the ELL has been in the US:
7. Subject areas strengths/weaknesses:
8. Participation in group work:
9. Gaps:
10. Support available to this ELL at school:

Part III: Focus on Culture

Introduction

Language/Linguistics

1.   Direction of language
2.   Alphabet
3.   Phonology
4.   Grammar
5.   Syntax
6.   Morphology

     Educational System

     1.

     2.

     3.

     4.

     Home Life

     1.

     2.

     3.

     4.

     Time and Space

     1.

     2.

     Student Behaviors

     1.

     2.

     Reflection on possible biases

     Works Cited

OBSERVATION FORM

Grade/Subject:

Teacher Observed:

Lesson Topic:

Lesson Objective:

STEP 1-Do Task Analysis* of the lesson plan per Academic Subjects Protocol:

SLIDE/TREAD ANALYSIS	
VERB A. *Copy and paste the directions, instructions, procedures and/or task into the table below.* B. *Be sure each sentence is in a separate row.* C. ***Bold** the verb(s) in each sentence.*	**SLIDE** or **TREAD** For each row in the table below, decide whether each **bolded** verb is a SLIDE or TREAD verb and type SLIDE or TREAD in this column.

STEP 2-FIELD NOTES

Write what you see the teacher doing to support ELs during the recorded lesson.

STEP 3-Reflection:

Elaborate on the observed lesson using the following guiding questions:

1. How did the teacher moderate language demands for the input, interaction, and output to promote comprehension? Provide examples.

2. How did the teacher elevate learner language? Provide examples.

3. How did the teacher activate background knowledge (cultural or content)?

4. What other tools/strategies, both verbal and nonverbal, would be appropriate to use in this lesson? Review Support Tools and Techniques.

Verbal tools/strategies:

Nonverbal tools strategies:

APPENDIX C

SHOW, TELL, BUILD* CODING SCHEME FOR ACADEMIC SUBJECT INSTRUCTION

Tools & Techniques Codes	Show & Tell Tools & Techniques Description
1	**Graphic Organizers for Academic Subjects**
1-**TGO**	**Teacher** used graphic organizers to depict concepts, relationships, and/or structure, indicating parts of focus when describing them
1-**SGO**	**EL Student(s)** used graphic organizers to depict concepts, relationships, and/or structure, indicating parts of focus when describing them
2	**Infographics, Diagrams, and Animations**
2-**TIM**	**Teacher** used images and diagrams, indicating parts of focus when describing them
2-**SIM**	**EL Student(s)** used images and diagrams, indicating parts of focus when describing them
3	**Models, Manipulatives, and Realia**
3-**TOP**	**Teacher** used objects and props, indicating parts of focus when describing them
3-**SOP**	**EL Student(s)** used objects and props, indicating parts of focus when describing them
4	**Gestures, Dramatization, and Total Physical Response**
4-**TAG**	**Teacher** used actions and gestures connected with speech
4-**SAG**	**EL Student(s)** used actions and gestures connected with speech
4-**TPR**	**Teacher** used Total Physical Response to elicit demonstration of EL student(s)' comprehension
4-**SPR**	**EL Student(s)** responded to Total Physical Response elicitation
5	**Teacher Talk**
5-**TSP**	**Teacher** spoke clearly and at appropriate pace
5-**TSP1**	Appropriate for levels 1-2
5-**TSP3**	Appropriate for levels 3-4
5-**TSV**	**Teacher** used EL-focused simplified vocabulary & phrasing of spoken statements
5-**TSV1**	Appropriate for levels 1-2
5-**TSV3**	Appropriate for levels 3-4
5-**TRP**	**Teacher** repeated or paraphrased statements
5-**TIW**	**Teacher** wrote key terms, said them, & showed an image of them (input waltz)
5-**SAL**	**EL Student(s)** actively listened or showed engagement (notetaking, etc.) during teacher talk
6	**Leveled Questioning**
6-TLQ	**Teacher asked content questions of ELs**
6-TLQ1	**Appropriate for levels 1-2**
6-TLQ3	**Appropriate for levels 3-4**
6-TLQ5	**Appropriate for levels 5-6**
6-SLQ	**EL Student answered the content question**
6-SCQ	**EL Student asked for clarification about the content question**
6-TWT	**Teacher allowed wait time for response by ELs**
6-TWT1	**Appropriate for levels 1-2**
6-TWT3	**Appropriate for levels 3-4**
6-TRS	**Teacher followed-up to EL responses**

6-TRS1	**By stating further details to levels 1-2 responses**
6-TRS3	**By recasting or expanding levels 3-4 responses**
6-TCC	**Teacher asked follow-up question to confirm comprehension based on ELs responses**
6-TEE	**Teacher asked follow-up question to elicit more expression based on ELs responses**
7	**Cooperative Learning and Academic Discussions**
7-TPG	**Teacher paired and grouped EL students based on EL level(s)**
7-TSA	**Teacher structured activities to foster participation of EL student(s)**
7-SPA	**EL student(s) actively participated in activity, communicating nonverbally and verbally**
7-SPA1	**Appropriate for levels 1-2**
7-SPA3	**Appropriate for levels 3-4**
8	**Leveled Text**
8-TST	**Teacher provided simplified and/or elaborated text for ELs**
8-TST1	**Appropriate for levels 1-2**
8-TST3	**Appropriate for levels 3-4**
8-SST	**EL Student(s) used leveled text**
9	**Modified Text**
9-TMT	**Teacher provided modified text for ELs**
9-TMT1	**Appropriate for levels 1-2**
9-TMT3	**Appropriate for levels 3-4**
9-SMT	**EL Student(s) used modified text**
10	**Sentence Starters, Sentence Frames, and Word Banks**
10-TDP	**Teacher used spoken or written discussion prompts for ELs**
10-TDP1	**Appropriate for levels 1-2**
10-TDP3	**Appropriate for levels 3-4**
10-TDP5	**Appropriate for levels 5-6**
10-TWB	**Teacher provided word banks for ELs**
10-TWB1	**Appropriate for levels 1-2**
10-TWB3	**Appropriate for levels 3-4**
10-SWB	**EL Student(s) referred to word banks for speaking or writing**
10-TSF	**Teacher provided sentence frames for ELs**
10-TSF1	**Appropriate for levels 1-2**
10-TSF3	**Appropriate for levels 3-4**
10-SSF	**EL Student(s) referred to sentence frames for speaking or writing**

From Show, Tell, Build: Twenty Key Instructional Tools and Techniques for Educating English Learners, for more information:
https://englishlearnerachievement.com/?page_id=1225

APPENDIX D

LESSON PLAN MODIFICATION ASSIGNMENT INSTRUCTIONS

1. Locate an original lesson plan.
2. Attach lesson plan to the of the Lesson Plan Modification Table.
3. Download the Lesson Plan Modification Table
4. Copy and Paste the Directions/Instructions/Tasks portion of original lesson plan to the top of the Lesson Plan Modification Table
5. Complete Phase 1, Step 1 of the ASP-Task Analysis
6. Complete Phase1, Step 2 of the ASP-Gap Analysis
7. Complete Phase 2, Step 1 of the ASP-Add Support
8. Complete Phase 2, Step 2 of ASP-When will support be conducted
9. Complete Phase 2, Step 3 of the ASP-When and Who will provide support

LESSON PLAN MODIFICATION TABLE

(Use this table to complete your Modified Lesson Plan assignment)
Original lesson plan (Copy and Paste):

PHASE 1-Step 1 SLIDE/TREAD ANALYSIS		PHASE 1-Step 2 ANALYZE STUDENT GAP	PHASE II-STEP 1 ADD SUPPORT	PHASE II-STEP 2 Universal, Supplemental or Alternative Time	PHASE II-STEP 3 Pre-teach, teach, co-teach, post-teach	PHASE II-STEP 3 Instruction Provider
VERB A. Copy and paste the directions, instructions, procedures and/or task into the table below. B. Be sure each sentence is in a separate row. C. **Bold** the verb(s) in each sentence.	**SLIDE** or **TREAD** For each row in the table below, decide whether each **bolded** verb is a **SLIDE** or **TREAD** verb and type **SLIDE** or **TREAD** in this column.	**GAP ANALYSIS** For each row, analyze the gap for **each** of the following: *Beginner (B):* *Intermediate (I):* *Advanced (A):*	**ADD SUPPORT** For each gap, add the necessary verbal and non-verbal support needed for each of the following: *Beginner:* *Intermediate:* *Advanced:*			
1.		*Beginner:* *Intermediate:* *Advanced:*	Beginner Verbal support: Nonverbal support: Intermediate Verbal support: Nonverbal support: Advanced Verbal support: Nonverbal support:			
2.		*Beginner:* *Intermediate:* *Advanced:*	Beginner Verbal support: Nonverbal support: Intermediate Verbal support: Nonverbal support: Advanced Verbal support: Nonverbal support:			

PHASE 1-Step 1 SLIDE/TREAD ANALYSIS		PHASE 1-Step 2 ANALYZE STUDENT GAP	PHASE II-STEP 1 ADD SUPPORT	PHASE II-STEP 2 Universal, Supplemental or Alternative Time	PHASE II-STEP 3 Pre-teach, teach, co-teach, post-teach	PHASE II-STEP 3 Instruction Provider
3.		*Beginner:* *Intermediate:* *Advanced:*	Beginner Verbal support: Nonverbal support: Intermediate Verbal support: Nonverbal support: Advanced Verbal support: Nonverbal support:			
4.		*Beginner:* *Intermediate:* *Advanced:*	Beginner Verbal support: Nonverbal support: Intermediate Verbal support: Nonverbal support: Advanced Verbal support: Nonverbal support:			
5.		*Beginner:* *Intermediate:* *Advanced:*	Beginner Verbal support: Nonverbal support: Intermediate Verbal support: Nonverbal support: Advanced Verbal support: Nonverbal support:			

REFERENCES:

SUMMARY OF ASSIGNMENT & RUBRIC

STEPS	EXPLANATION	POINTS
1	Choose a lesson plan to modify *Must be copied and pasted at the top of the Lesson Plan Modification assignment table or submitted as a separate file in the assignment link to be considered for grading	Must have
2	A. Complete a **SLIDE/TREAD analysis** for the directions, instructions, procedures and/or task in your lesson plan modification table (make sure SLIDE/TREAD are capitalized, as they are acronyms). B. Be sure each sentence is in a separate row. **C.** **Bold** the verb(s) in each sentence.	60
3	Complete a **Gap Analysis** by analyzing the gap for **the beginner, intermediate and advanced** for each of the verbs in the Slide/Tread analysis.	30
4	For each Gap**, Add Support.** Be sure to include the following with **bolded** headings indicating the type of support**:**	
	A. **Non-Verbal** Supports (Examples can be found in chapter Models, Manipulatives, Realia	30
	B. **Verbal** Supports (Examples can be found in chapter Teacher Talk	30
	C. 2 **Leveled Questions** (Some examples can be found in *Show, Tell, Build* **pages 55-63**) <u>for each</u>: Beginner Intermediate Advanced	60
	D. Include **Show and Connect to Background Knowledge** activity *Indicate how you will modify for the Beginner, Intermediate and Advanced EL	30
	E. Include **Show and Connect to Content/Academic Vocabulary** *Indicate how you will modify for the Beginner, Intermediate and Advanced EL	30
	F. Include at least one **graphic organizer (***Show, Tell, Build* **pages 19-26; 159-165; 183-189), info-graphics, diagrams and animations (***Show, Tell, Build* **pages 27-36)** and *explain* how it will be used for each level of English proficiency (attach)	30
	G. Include **modifications to lesson plan assessment for all levels of English proficiency** (attach)	30
	H. **Leveled/Modified texts** *Show, Tell, Build* **pages 73-88)**-create in a ppt presentation-slides for Beginner, Intermediate and Advanced (attach)	30
	I. Included how instruction delivered (universal, supplemental, alternative; when instruction delivered (pre-teach, teach/co-teach, post-teach); and, who will provide instruction	20
7	**REQUIRED HEADINGS (bolded):** **Non-Verbal Supports** **Verbal Supports** **Leveled Questions** **Show and Connect to Background Knowledge** **Show and Connect to Content/Academic Vocabulary** **Graphic Organizer** **Leveled/Modified text** **Assessment**	10
8	**References** of resources are included	10
	TOTAL POINTS	**400**

Adding Flexibility to Curriculum: A Practical Guide for Student-Directed Assessment

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When the COVID-19 pandemic hit the world, universities moved their instruction online to maintain social distancing and flatten the curve. Instructors who had limited experience in online teaching are challenged to shift the face-to-face courses online within a short time. This chapter explores ways to incorporate student-directed assessment (SDA) to smoothly transit the instructional format and remain sensitive to various student needs. Early results based on student performance and submissions offer insight into how SDA has allowed curriculum flexibility and encouraged students to make decisions on individual learning paths during the pandemic. A table of suggested technology tools for implementing SDA is provided at the end of the chapter.

INTRODUCTION

During a disruptive event, such as a pandemic or a hurricane, schools and universities have to close, and all instructions need to switch online. Instructors who are used to teaching face to face need to reconsider the course design to ensure the higher flexibility in an online learning environment (Crawford-Ferre & Wiest, 2012). Instructional activities should be compatible with varied student backgrounds and learning needs, especially when they only have limited resources at home. Another challenge with online instruction is student engagement. In an online learning environment, instructors can hardly monitor student involvement and the learning process in the same way as in face-to-face teaching (Trees & Jackson, 2007). More roles need to be given to students to personalize their learning and increase engagement (Song & Hill, 2007).

Incorporating student-directed assessment (SDA) can be a solution to quickly switch face-to-face instruction online and maintain pedagogical soundness (Hay, Tinning, & Engstrom, 2015). SDA is a learning process that affords students autonomy to identify their learning objectives, determine knowledge assessment criteria, and demonstrate mastery of learning outcomes in various ways (Fletcher & Shaw, 2012). For pre-service teachers, SDA not only helps them learn the course content but also gives them the opportunity to think about the kind of teacher they want to become (Evans, Davies, & Penney, 1999; Redelius & Hay, 2009).

INNOVATION

To help effectively switch the instruction online and provide more flexibility to students, SDA was mindfully incorporated as pedagogical work in a graduate-level course in which students learned how to design person-centered instruc-

tion. The SDA contained three parts and six steps. For the first part, students individually create an assessment. For the second part, students present a lesson plan and use the assessment for peer evaluation and self-evaluation. For the last part, students submit a report that analyzes the evaluation results and identifies areas for improvement.
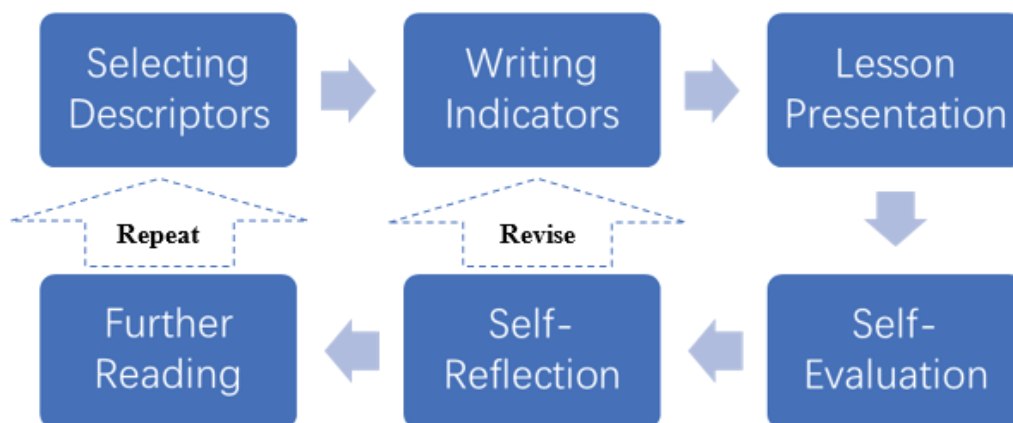
Figure 1. Steps for SDA.

Figure 1 above summarizes the steps comprising SDA. In the beginning, students select descriptors of person-centered instruction in the context of their classroom teaching. Because the students in the course are also teachers across a variety of subjects and grade levels, ranging from preschool to higher education, they need to select descriptors that are most appropriate for their teaching practices. For example, preschool students are generally not developmentally ready to make judgments regarding their learning process, so the descriptor "encouraging learners to make judgments" might be more appropriate for a higher education context than a preschool context. The students then formulated an assessment by determining one observable indicator for each descriptor as criterion to evaluate the latter's effectiveness.

During lesson presentation, the graduate students who also serve as graduate instructors in other courses were instructed to use the person-centered approach to teach a lesson in their own classrooms as part of a course assignment. When instruction moved online, modifications were made so that the students could conduct their lesson presentations to classmates online to build collective knowledge and foster collaborative discussion (Van Aalst & Chan, 2007). The assessment created in Step 2 was then distributed to classmates for peer evaluation. *Figure 2* is an excerpt from a student-created assessment with peer feedback. The lesson presentation was recorded for self-evaluation using the same assessment.

Figure 2. Excerpt from a student-created assessment.

Students then submitted a self-reflection report based on both peer feedback and self-evaluation results. In the report, they need to include a lesson plan, a comparison of evaluation results, a summary of strengths and weaknesses, and recommendations for changes. In the next step, students either modified their indicators for another iteration or identified further reading to address issues exposed during the process. Students submitted a final report as a learning portfolio to demonstrate learning outcomes and meet the needs of teachers and students (Gottlieb, 2000).

To facilitate the SDA process smoothly, different leadership roles were assigned to students for cooperative discipline, including "facilitator" and "time manager" (Freiberg, 1996). Facilitators helped to solve technical questions during online meetings, such as how to share the screen. Time managers kept track of time for individual presentations in each small group. By taking on these roles, students were able to conduct small group online presentations even when the instructor was not present in a session.

RESULTS

The SDA helped students become aware of the strengths and weaknesses of their teaching practices without waiting for the instructor's feedback. As illustrated in *Figure 2*, they can improve their observable practices by reflecting on the comments. Various perspectives were evident in the final reports because of the varied areas of expertise and instructional contexts represented in the course community. For example, one student criticized the SDA for its minimal guidance as compared and contrasted to Low Inference Self-Assessment Measure (Anderson & Freiberg, 1995), while another student appraised it for the expansive freedom it provided while also being supported by pedagogical theories. Across the student-created assessments, a unique combination of descriptors and indicators was created to ensure alignment with their personal teaching practices. For example, although some students chose the same descriptor regarding the use of questioning techniques to check learners' progress and understanding of instructional materials, each student generated his or her own indicators, such as exit tickets, questions eliciting connections to prior experience, and small group discussion questions.

The assigned leadership roles inspired students to take ownership of their learning (Freiberg, 2013) during the pandemic, especially when their instructor is not familiar with web-based tools for online teaching.

IMPLICATIONS

SDA is a beneficial method to accommodate various student backgrounds and facilitate the improvement of personalized instructional practices (Mok, 2012). Through SDA, students design observable criteria that are most appropriate for their classroom teaching and professional development (Pilling-Cormick, & Garrison, 2007). To start, instructors can change the existing assignment rubric to a list of descriptors for students to select. For students, writing one observable indicator for each descriptor is a good beginning; this helps them to focus on how their work can reflect each descriptor. Notably, it is important to ensure that students write indicators observable in their work instead of merely observable indicators so that during the peer evaluation and self-evaluation, the effectiveness of each indicator can be determined easily to identify the strengths and weaknesses of the presented work. Otherwise, students should propose an alternative indicator for improvement. Although students direct the entire learning and assessment process, instructor acknowledgment and support are essential for student creativity as various or even opposite perspectives can emerge (Fletcher, 2015).

Incorporating SDA involves preparing students to shift from a teacher-centered approach to a student-centered approach so that they can focus on active learning instead of pursuing correct answers (Hains & Smiths, 2012). The student leadership roles help students adjust to the change since they tend to satisfy leadership expectations when they are assigned as a student manager (Xie, Yu, & Bradshaw, 2014). In the beginning, instructors can plan student leadership roles for normal routines, such as starting a meeting and wrapping up a meeting. Instructors can also assign leadership roles on an ongoing basis. For example, a time manager can be assigned when an instructor tends to speak overtime during the online meeting. The application of student leadership roles engages students to collaboratively run a lesson or solve problems (Freiberg, 1996).

It is optional for students to revise the indicators or repeat the assessment as signified by the arrows with a dashed line in *Figure 1*. However, the last step—further reading—plays an important role in the SDA as it completes an experiential learning cycle. Students can continually use the method of assessment to improve their learning (Kolb, 1984).

Below is a list of technology tools that can be used to implement SDA.

Table 1

Technology Tools to Implement SDA

Tool Name	Tool URL	Ways to Implement SDA
Google Docs	https://docs.google.com	Creating an assessment and collecting evaluation results
Google Forms	https://www.google.com/forms	
Zoom	https://zoom.us/	Presenting lessons in small groups
Microsoft Teams	https://www.microsoft.com/en-us/microsoft-365/microsoft-teams/group-chat-software	
Google Spreadsheet	https://www.google.com/sheets	Analyzing data
Tableau	https://www.tableau.com/academic/students	Visualizing advanced data

FUTURE RESEARCH

SDA can be designed as a student-centered pedagogical work instead of a student-led assignment. Students can start selecting their descriptors for the final capstone at the beginning of the semester. They can then modify the descriptors and write relevant indicators as they further explore and understand the topics. In the middle of the semester, students need to present their draft projects in class and collect peer feedback. At the end of the semester, students need to submit a report that contains an analysis of peer feedback and self-evaluation and scholarly resources to support and extend the analysis. Instructor observation notes and student assignments are also collected to assess student engagement in the SDA. Meanwhile, student feedback is collected to evaluate the effectiveness of the assessment as pedagogy.

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Teaching Online Teaching: Using the Task-Centered Instructional Design Strategy for Online Computer Science Teachers' Preparation

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Due to its rapid changing nature, the field of Computer Science requires learners to develop self-directed on-line *learning* skills, and teachers to develop online *teaching* skills. In this paper, we describe the instructional approach we used in the Methods of Teaching Computer Science (MTCS) course, in which we utilized the task-centered instructional strategy within a blended learning course format for preparing preservice computer science teachers for online teaching. As COVID-19 forced all teachers in the world to go online, we believe that our method can be used for teaching online teaching in wider preservice teachers' programs and in-service professional development.

Keywords: online learning, task-centered instructional strategy, teacher education, computer science education, asynchronous learning, self-directed learning, computer science teacher education

INTRODUCTION

Rapid advances in information and communication technologies (ICT) lead to rapid growth of ICT-based education formats such as Massive Open Online Courses (MOOCs), online, and blended learning (Siemens et al., 2015). Online education continue to grow, even though overall higher education enrollments is declining (Allen & Seaman, 2016). Nevertheless, while online learning is reported by academic officers to be strategic and comparable to face-to-face instructions, overall only 29.1% of chief academic officers believe that their faculty accept the legitimacy and value of online education (Allen & Seaman, 2016). One reason for this phenomenon could be faculty's lack of experience as learners in online learning environments and the role they should play as teachers in this context. As noted by Mishra and Koehler (2006, p. 1030), "The addition of a new technology … often raises fundamental questions about content and pedagogy that can overwhelm even experienced instructors". As programming languages are constantly changing, requiring programmers to constantly update their knowledge and skills through online learning, we believe that pupils should be prepared for online learning as well, and to do that, teachers should be trained to teach online. The COVID19 pandemic has further emphasized the need to prepare pupils for online learning and teachers for online teaching.

In this paper we describe the instructional approach we used for teaching preservice computer science teachers online teaching. First, we believe that in order to teach online, one should first experience online learning as a *learner*. For that, we utilized asynchronous online learning to enable an online learning experience for the preservice teachers. Second, based on Merrill's First Principles of Instructions (Merrill, 2009), we used the Task-Centered Instructional Strategy, in which a progression of complete tasks with increasing complexity is specified and serves as the backbone of instruction for teaching online teaching. In the area of COVID19, we believe that this approach can be utilized in preservice teachers' education as well as in in-service professional development across various subject matter.

INNOVATION

In this section we will describe in details the implementation of our instructional approach. Fourteen preservice teachers (seven males and seven females, age range 23-50) participated in the course "Methods for Teaching Computer Science", which is one of the mandatory courses for receiving a computer science teacher certificate for high school, with four weekly hours over 13 weeks. The preservice teachers consented to participate in this study. The course covers

pedagogical and technological methods (Hazzan et al., 2015) for teaching programming paradigms including logical programming and functional programming, computational models including finite state automata and Turing machine, and machine learning.

The instructional approach that we used to achieve the goal of preparing preservice teachers to teach online included: (a) hybrid course format, and (b) a progression of online teaching tasks, as will be described below.

(a) Hybrid Course Format

In order to *teach* online, we believe that one should first build a mental model of what it entails to *learn* online. Thus, we utilized a blended learning approach, where each F2F week was followed by two online learning weeks. The F2F weeks, included active learning focusing on the course tasks and class discussions. The online learning weeks were fully asynchronous, and included: (1) videos, with approximately six 10-minutes videos per week, totaling to one hour of online instructions, (2) programming assignments that covered the topic of each week, (3) pedagogical assignments such as writing assignments, giving feedback to peers, designing a lesson, etc., and (4) discussion forums that covered pedagogical, content, and technological issues.

(b) A Progression of Online Teaching Tasks

While the preservice teachers gained experience as online *learners*, they were prepared for online *teaching* through a progression of tasks with increasing complexity (Merrill, 2007). We used a progression of online teaching tasks, with an increasing complexity of integration between technology, pedagogy, and content knowledge (Mishra & Koehler, 2006), as described below:

Task 1 – Recording the first online video

The first task included a simple integration of technological, content, and pedagogical knowledge. As our preservice teachers had no prior experience in self-recording lectures, the first task was devoted to learning the basic technological skills: installing and operating a screen and video recording software, editing the lecture video, and publishing it online. The video had to cover a simple problem that was already solved in the classroom.

Task 2 - Preparing online presentation for class peers

For the second task the preservice teachers prepared two asynchronous presentations, each one reviewing a twelve-grade computer science project that was developed in a school they visited. The goal of this task was twofold. First, the students were exposed to a variety of school projects presented by their peers' videos, and second, the students practiced online delivery of self-produced content in a supporting and nonjudgmental environment of their classmates.

Task 3 - Preparing online lecture for pupils

The last task included a complex integration of technological, content, and pedagogical knowledge. The preservice teachers had to present a solution to a high school national exam question. The task was executed in seven phases: (1) Selecting an exercise and solving it, (2) Presenting the solution F2F to a peer, (3) Improving the presentation of the solution based on the peer's feedback, (4) Self-recording the lecture, (5) Presenting the video to peers for additional feedback, (6) Revising the video, and (7) Publishing the second version on a video sharing web service that will be available to students.

RESULTS

Overall, as learners in the course, the preservice teachers reported that online learning required more effort than F2F learning (see Figure 1). Nevertheless, when asked about what should be the ratio between online and F2F lessons, their overall preference was towards more online learning lessons than F2F lessons (see Figure 2). When asked to explain, one student said that "while online learning required more effort, it also saved travel time and was overall more efficient for learning".
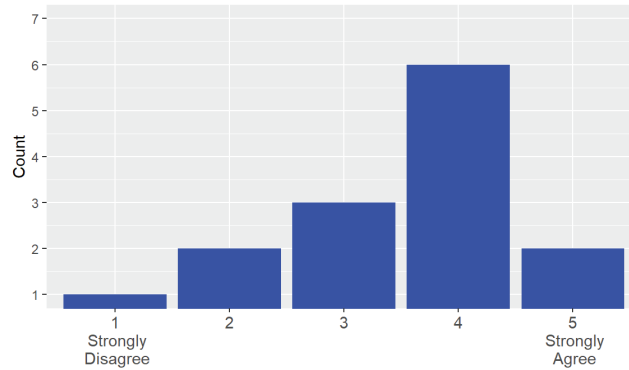
Figure 1. Preservice teachers' response to the question "Online learning requires more effort than F2F learning"
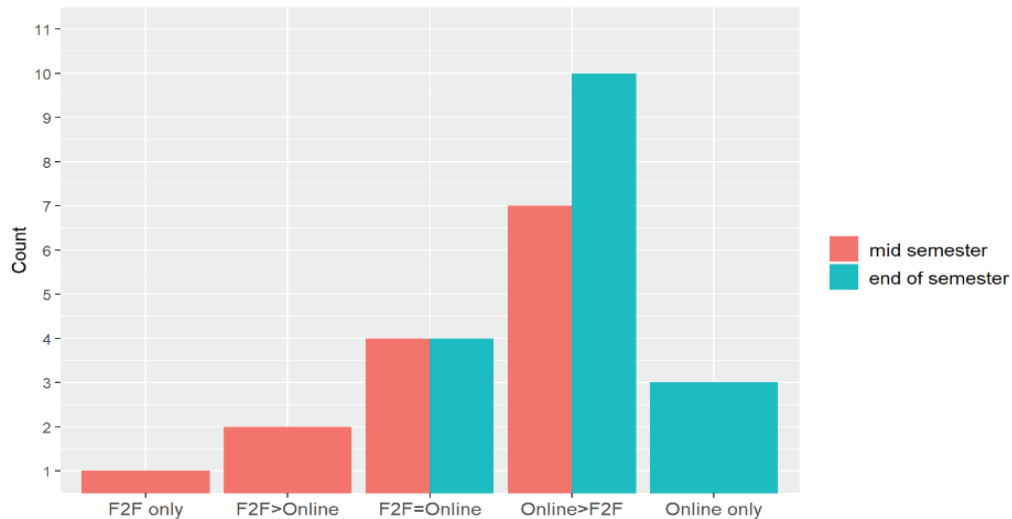
Figure 2. Preservice teachers' preference for the number of F2F vs. Online lessons.

In terms of confidence to teach online, while we found significant differences in students' confidence to teach the different topics taught in the course, $F(4, 134)=6.19$, $p<.0001$, we found no significant difference in students' confidence to teach F2F vs. online, $F(1, 134)=0.7$, $p=0.4$ (see Figure 3). The differences in students' confidence to teach the different topics stemmed from the topics' perceived difficulty as reported by the students, which was significantly negatively correlated to their reported confidence ($r=-0.43$, $p<.0001$).
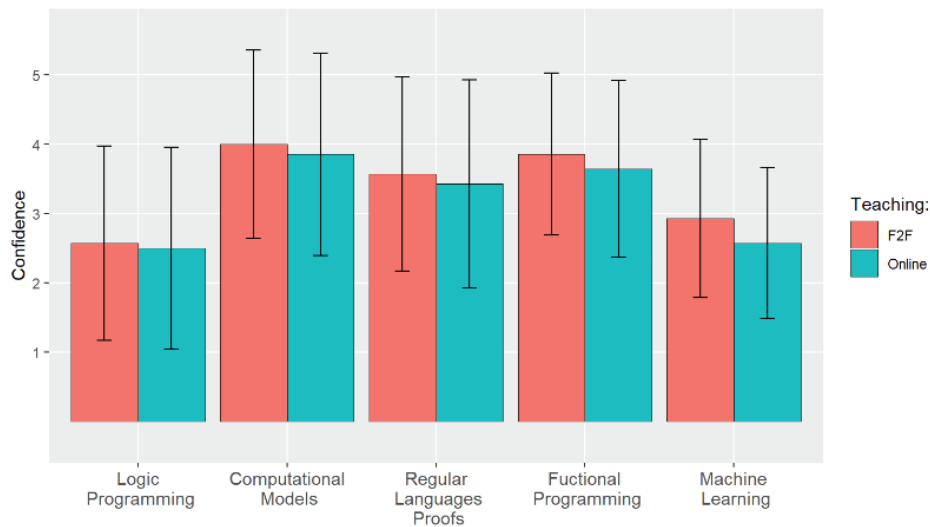
Figure 3. Confidence (from 1-*very low* to 5-*very high*) to teach F2F and Online in high school by course topics.

IMPLICATIONS

Implementing the Task-Centered Instructional Strategy, with a gradual progression of online teaching tasks, and in the context of online learning was successful in developing preservice teachers' positive attitudes towards online learning and confidence in online teaching. Our results indicate that even though the preservice teachers in the course had very little experience in online learning and teaching, by the end of the course they developed a preference for online learning as students, and their confidence to teach online was not significantly different than their confidence to teach F2F. We believe that this approach can be implemented across subject matter, in preservice teachers' education as well as in in-service professional development. Specifically, we suggest the following implications:

1. Provide preservice and in-service teachers opportunities for online learning experience from a student point of view. We believe that one of the obstacles faced by teachers in the COVID19 time is their lack of personal experience as learners in online learning environments. While online teacher preparation programs existed prior to COVID19 (Kennedy & Archambault, 2012), these days all preservice teachers across academic institutes get to have a taste of what online learning entails. Nevertheless, while in-service teachers are experiencing online teaching, their ability to do that effectively may be limited by their lack of experience as online learners (He, 2014). We therefore believe that it could be extremely beneficial to develop online pre and in-service professional development programs also post COVID19. Teachers could also develop their understanding of being an online learner through participation in existing MOOCs in their own content area, which can serve at the same time as means for domain specific professional development (Vivian et al., 2014).

2. Develop online teaching skills through task progression. While essential, gaining experience as online learners is not sufficient to prepare for online teaching, just like being a student in F2F settings is essential but not sufficient for F2F teaching. Preservice and in-service teachers should be therefore prepared for the integration of technology, pedagogy, and content knowledge for online teaching. We utilized Merrill's (2007) Task-Centered Instructional Strategy to design a course that revolved around a progression of online teaching tasks, with a gradual increased difficulty level of integration between technological, pedagogical and content knowledge (see also Merrill, 2009). Due to the nature of computer science online learning our course design revolved around asynchronous online teaching tasks, nevertheless, in other domains, where appropriate, a progression of tasks could revolve around synchronous online teaching pedagogy.

3. Implications for Computer Science Education. Our initial motivation for this approach stemmed from the rapid changing nature of computer science and programming languages, requiring the development of advanced self-

regulated learning skills, which in many cases involves learning in MOOCs (Alonso-Mencía et al., 2020). Thus, regardless of the pandemic situation, we believe that computer science students should start to develop self-regulated learning skills as early as K-12, and for that they should experience the online learning modality as early as possible. In addition, online teaching computer science requires pedagogical integration of additional development technologies (e.g., O'Hara et al., 2015; Rodger et al., 2009; Weintrop & Wilensky, 2018) to the context of online learning, and should be addressed in teacher preparation and professional development programs.

FUTURE RESEARCH

This era raises many questions that should be further explored through research. What should preservice education and in-service professional development look like post COVID19? The course described in this paper was conducted just prior to the beginning of the pandemic and enabled us to utilize a blended approach that included online and F2F learning modalities. These days this course has been converted to be fully online, with combination of asynchronous and synchronous learning. While we believe that there should be a combination of the two learning modalities, further research is needed to extract the optimal ratio of these modalities for preservice teachers and in-service professional development. Yet the biggest question in our opinion that remains open is what should K-12 education look like? What learning modalities should be utilized in schools post COVID19? Should it return to what it was the day before the pandemic? Or could this pandemic serve as a catalysator for a paradigm shift at large?

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Resisting Dehumanizing Assessments:
Enacting Critical Humanizing Pedagogies in Online Teacher Education

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With the shift to online learning in the wake of COVID-19, teacher educators (TEs) risk becoming swept up in a "cult of efficiency" that can dehumanize the learning process for teachers and students. In this chapter, we share how we, four TEs, use new technologies to implement *critical humanizing pedagogies*. This involves pushing beyond purely cognitive approaches, while reflexively addressing issues of power, access, and representation with emphasis on valuing voices historically subjected to colonizing educational practices. Specifically, we discuss our approach to online assessments, focusing on meaning-making, connecting to social realities, and engaging multimodality. We close the chapter by offering a set of guiding questions and technology tools that may help TEs (re)designing their own online assessments with students' humanity in mind.

INTRODUCTION

With the shift to online learning in the wake of COVID-19, teacher educators (TEs) risk becoming swept up in the flawed "cult of efficiency" (Callahan, 1964), unintentionally designing online courses like little learning factories, with a crude focus on quick, standardized evaluation of student learning at scale. Quizzes, tests, assignments, or activities that assume one single correct answer, fail to connect with students' lived realities, or expect students to respond in a "cookie cutter" format do not address the socio-cultural, embodied, relational, and affective nature of teaching and learning (Andrews et al., 2019; Bartolomé, 1994; del Carmen Salazar, 2013). Such approaches dehumanize learning for all, while posing particular harm to students historically subjected to colonizing educational practices (Paris & Samy Alim, 2017). In this chapter, we share how we, four TEs, are implementing *critical humanizing pedagogies* (e.g., Mehta & Aguilera, 2020) in the context of online assessments. We broadly define critical humanizing pedagogies as teaching and learning practices that push beyond purely cognitive approaches, while reflexively addressing issues of power, access, and representation. We share our examples with the hope that they inspire readers to discuss, critique, and (re)design online assessments to humanize students' course experiences.

INNOVATION

How can TEs use technologies to implement critical humanizing pedagogies in online assessments? We begin to answer this question by sharing artifacts of online assessments that we individually developed for our pre- and in-service teacher education courses, before and in response to the COVID-19 crisis. We annotated these artifacts to illustrate critical humanizing design decisions and technologies used, along with preliminary outcomes. Our artifacts are imperfect, authentic, and intentionally unmodified from their classroom use. In the spirit of *critical* humanizing, we hope readers will *critique* our examples, while drawing inspiration from them as well. The artifacts illustrate three humanizing approaches, which were present across our practices: assessing for meaning, connecting to social realities, and engaging in multimodal learning.

Assessing for Meaning

We aimed to design evaluations that assessed for meaning and purpose, as opposed to strict numerical principles. When using traditional assessments, such as multiple choice formats, we redesigned them to emphasize formative learning instead of summative learning. We did this by not counting scores for a grade and providing opportunities to explain and/or correct answers. Assessment can be part of a humanizing pedagogy when it is as iterative, diverse, and meaningful as our students. When possible, we avoided assessments with "right" answers altogether. We used rubrics to communicate and enact high expectations for student outputs (Morrison et al., 2008) while enabling students to express knowing in different ways (Hillard, 2009) via open-ended outputs that involved student choice. We prioritized feedback provided by the professor, peer, and/or self, rather than our judgement of student work being "right" or "wrong" (Stommel, 2018).

- Ben's Modified Multiple Choice Midterm: https://bit.ly/MultChice
- Catharyn's Weekly "Tech Task" Assignment and Rubric: https://bit.ly/FormativeEx

Connecting to Social Realities

Part of the commitment to a critical humanizing pedagogy is a recognition that we are all part of different social worlds, which can be marked by issues of power, inequity, and representation - these are the social realities that we live in (Freire, 1998). We tried to appreciate the experience and cultural knowledge students brought to class, while understanding their learning over our semester together as a sociocultural process (Moll et al., 1992). For example, we aimed to understand the realities around students' mental and physical health to provide support accordingly, particularly in the wake of the COVID-19 pandemic. To reduce unnecessary stress, we commonly offered flexible deadlines and reduced (or omitted) late submission penalties. Additionally, we tried to provide equitable opportunities for students to complete coursework in ways that accommodated their lives and contexts. We thought about how assignments would "work" for a student with limited internet access, a special learning accommodation, or one who worked the graveyard shift the night before a due date. With these considerations in mind, we continually revised and adapted curricula to meet the particular needs of our students and their communities, as well as current world issues.

- Earl's "Be the Change" Project Developed as a Response to COVID-19: https://earlaguilera.com/modified-final-project-overview/

Engaging Multimodal Learning

We aimed to design a learning community that leverages multiple modalities, spanning the individual and collective passions, interests, and experiences of students and instructor. As TEs who were developing artistic and creative pursuits ourselves, we were driven to offer a range of assessments that nurture student choice and voice, and provide opportunities for aesthetic expression that go beyond textual formats (Kress, 2009). We value flexibility and diversity as core components of the learning process, knowing that our social realities are varied, so students' course artifacts must be multiple. We tried to give students freedom to select the ways they demonstrate their learning while creating space for them to take intellectual risks in the process.

- Ben's Modified Final Exam Developed as a Response to COVID-19: https://bit.ly/NewFinal
- Rohit's Livestream Team Final Presentation: https://mehtarohit.com/webinar-285/

RESULTS

By implementing critical humanizing assessments, we learned about our students and ourselves. Students generally reacted positively and produced high quality outputs for our assessments. Earl's students indicated that the Be the Change project was "meaningful and something we could all relate to," with one student even calling the project "therapeutic." Nonetheless, across our courses, some students initially express discomfort, hesitation, and unfamiliarity with humanized assessments simply because they were different from the norm. It took time for students to understand the value of slow, sustained learning, with "success" looking different across individuals.

Second, we found that to engage in critical humanizing, we as instructors collectively embodied three vital dispositions. We centered on care, by prioritizing our own and our students' mental and physical health. We were ready to change course content, formats, or pacing in response to collective and individual student needs. We were ready to critique issues of power, access, and representation in our classrooms, our universities, and our world.

IMPLICATIONS

Critical humanizing pedagogies cannot be whittled down to a set of prescriptive "best practices." Instead, educators must interrogate, critique, and explore themselves, their students, their class structures, and their institutions (Mehta & Aguilera, 2020). With this in mind, we present advice inspired by the themes and artifacts presented in this chapter in the form of a series of questions and technology tools that TEs may use when (re)designing online assessments.

Am I Assessing for Meaning?

Does my online assignment, activity, project, or test/quiz…
- Allow for students to express "right" answers in a variety of ways?
- Allow students to express a variety of "right" answers?
- Communicate high expectations for students with a rubric, perhaps a single point rubric (Fluckiger, 2010)?
- Allow for feedback from the instructor, peer(s), or student self-feedback?
- Prioritize formative learning, with assignments that students know are valuable, but not "high stakes"?

Some useful technologies include:
- **Padlet**, a digital bulletin board, where students post their work for others to view
- **Google Docs** for student written submissions that can be commented on and edited by instructor, peers, and self

Am I Connecting to Social Realities?

Does my assignment, activity, project, or test/quiz…
- Connect with what matters to my students and their communities today (Moll et al., 1992)?
- Avoid inequitable expectations for students made vulnerable by existing social structures (e.g., make accommodations for students who are caregivers or those with limited internet access)?
- Avoid unnecessary stress placed on students due to rigid deadlines?

Some useful technologies include:
- **Adobe Spark** for students to create projects via mobile phone, tablet, or traditional computer, which provides equitable opportunities for students to complete coursework in ways that accommodate their lives and contexts

Am I Engaging Multimodal Learning?

Does my assignment, activity, project, or test/quiz…
- Encourage students to experiment with new forms (modes) of expression, demonstrate creativity through experimental endeavors, or take intellectual risks?

Some useful technologies include:
- **Livestreaming (via YouTube or other provider)** to present enduring course understandings to an authentic audience
- **FlipGrid** for students who want to record videos, which provides an accessible way to encourage conversation between learners
- **Instagram**, a social media platform that embraces visual aesthetics, may be a space for student connection, inspiration, and communication

FUTURE RESEARCH

This research illustrated how four TEs implement critical humanizing in online assessments by assessing for meaning, connecting to social realities, and engaging multimodal learning. Nonetheless, our approaches were individual, imperfect, and dynamic. Furthermore, critical humanizing pedagogies extend well beyond the three themes we highlighted. Future research of how other individuals, collaboratives, departments, and colleges engage in critical humanizing over time, across contexts, and in different ways is needed. To truly address a commitment to social justice and educational equity, TEs need to challenge and dismantle the cult of efficiency (Callahan, 1964) that continues to infiltrate educational systems and contaminate pedagogy and praxis. We suggest critical humanizing pedagogies (Mehta & Aguilera, 2020) as one path toward social justice and equity in the classroom.

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Promoting Mathematics Problem Solving and Collaboration in Synchronous Courses

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Effective mathematics instruction encourages collaboration and discourse as students practice reasoning and problem solving by making and testing conjectures, explaining reasoning, and critiquing the reasoning of others. Orchestrating such an environment presents a unique challenge in synchronous online settings where conversations usually take the form of two way conversations between the instructor and one student rather than collaborative problem-solving of a mathematical task. An example of collaborative problem solving using breakout groups, the whiteboard, emoticons, and the chat feature in an online interface in a graduate course for K-8 in-service and preservice teachers is shared followed by a discussion of the results of the activity. Finally, recommendations for instruction and directions for future research are suggested.

INTRODUCTION

During the Spring 2020 semester, K-8 preservice and in-service teachers were enrolled in a graduate course focused on the topics of rational numbers and learning trajectories. Due to the range of classroom experiences and grade levels taught, meaningful conversations about problem solving and student understanding were essential to make sense of course topics. According to NCTM's Principles to Actions (2014), "an excellent mathematics program requires effective teaching that engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of mathematical ideas and reason mathematically" (p. 7). This type of environment can seem challenging to create when teaching online. However, McBrien, Jones, and Cheng (2009) found that with interface features available in online learning environments (such as Saba Meeting, WebEx, Zoom, etc.), students described an enhanced learning experience with improved communication, high levels of satisfaction with the course, and strong group cohesion when compared to asynchronous designs of online courses.

Slagter van Tryon and Bishop (2009) proposed a framework for thinking about social connectedness in online learning, which they refer to as e-mmediacy. E-mmediacy strategies include increasing the quantity and quality of interactions for group norms to develop. These suggestions for effective instruction and social connectedness guided the development and implementation of asynchronous and synchronous course activities.

INNOVATION

The course met synchronously and asynchronously on alternating weeks. The synchronous meetings were used to address questions or misconceptions that arose during the asynchronous work, practice problem-solving strategies, and introduce new topics. Importantly it gave participants and the instructor a virtual face to face connection. The use of breakout rooms, the whiteboard, emoticons, and the chat feature of the online interface was helpful in engaging participants in meaningful conversations about problem solving during those sessions while providing the instructor with insight into the understanding and needs of the participants.

For example, during one synchronous meeting participants were reviewing strategies for comparing and ordering fractions. To practice the strategies, participants engaged in a problem solving activity. First, the instructor explained the expectations for completing the problem. Participants were randomly placed in breakout groups of 3-4 students and assigned a small set of fractions to put in order. Breakout rooms are a feature of online interfaces that allow groups of two or more participants to meet and collaborate during a larger live online session. (Note: Although I did not use this option

for this problem, a manual option exists for placing participants together who teach the same grade level, pairing in-service with preservice teachers, or other specific grouping purposes.)

Each group was given a different predetermined set of 6-8 fractions (see Table 1). Once the groups were created using the breakout groups feature, the instructor joined each group to listen to the conversations and descriptions of how they decided which fraction was the smallest or largest and how they ordered them. This provided the instructor with a sense of their level of comfort in discussing and using various strategies for comparing fractions.

Table 1
Predetermined Rational Numbers Assigned to Small Groups

Breakout Group	Rational Numbers
Group 1	1/3, ¾, 4/10, 1/5, 3/8, 7/8, 3/6
Group 2	1, 2/10, 8/10, 5/6, 1/3, 2/8, 4/8
Group 3	2/3, 6/10, ½, 1/6, 1/10, 6/8, 0
Group 4	5/7, ¼, 1/8, 7/12, 3/5, 10/15, 9/10

Breakout groups ended once a set time passed or each group was visited. Using the shared screen function, the instructor displayed a PowerPoint slide with an image of a "clothesline" on it. To engage the participants in additional discourse, the instructor asked, "Who thinks their group had the largest or smallest rational number?" The participants were asked to record the number on the clothesline by using the electronic whiteboard feature to write or draw on the screen. Next, the instructor asked, "Which fractions might be easiest to place next?" Participants mentioned that halves and fourths would be the next easiest choice. The instructor asked them to add those fractions to the clothesline. As participants placed them the instructor posed the question, "What made those fractions easy to place?" At this time the instructor checked to ensure that they were paying attention to not only the order but also the spacing between the fractions. For example, 1/4 should be visually halfway between 0 and 1/2. Once those fractions were added and the class agreed that they were placed correctly, participants placed more challenging fractions on the clothesline.

After all fractions were placed, participants were asked to look at the clothesline and determine whether they agreed with the placement of the fractions. They indicated agreement or disagreement by clicking on the thumbs up or thumbs down emoticon. The instructor selected two fractions that seemed too far apart (for example 1/10 and 2/10) and asked about their placement. This conversation was meant to encourage participants to visually divide the number line into equal-size parts or to use alternative strategies to compare fractions, such as closeness to 0 or 1/2.

RESULTS

All participants were engaged in the small group and large group discussion that led to the solution of this task. The instructor was able to check for participation by visiting small groups and monitoring fractions as they were posted on the number line. Questions asked by the instructor during the full class conversation allowed for additional assessment of understanding of the various strategies that were presented during the asynchronous course meeting. The fraction clothesline that was created as a result of this collaborative problem solving activity is in Figure 1.

Activity 1: Fraction Clothesline
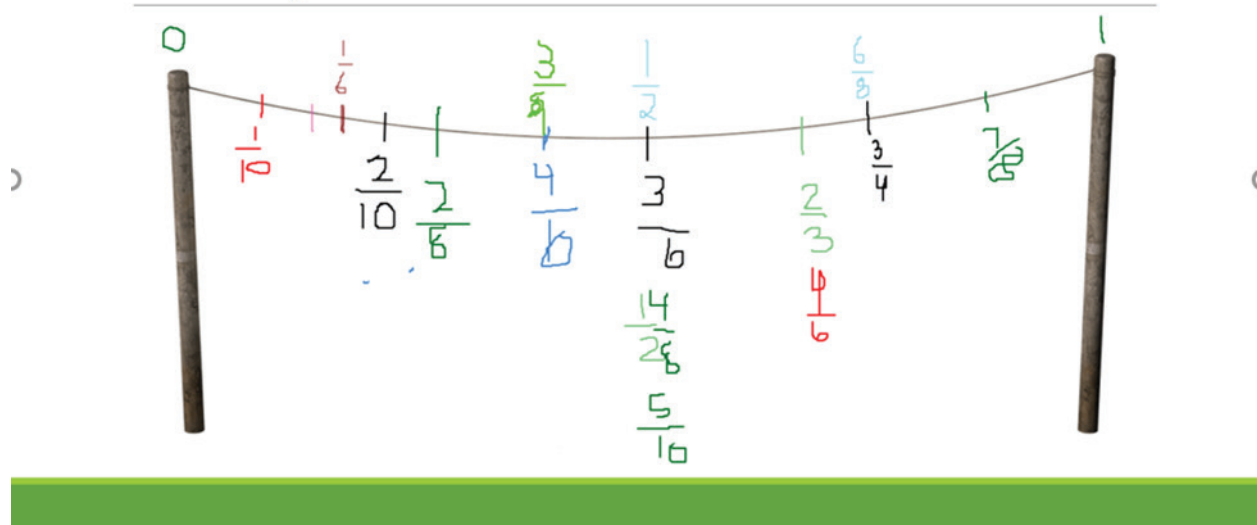
Figure 1. Example fraction clothesline.

In reflections posted in the chat feature at the end of class, participants mentioned the relevance of this activity for their understanding of fraction comparisons. They commented on specific strategies that they learned and were able to practice, such as comparing common numerators and using benchmark fractions. Participants also revealed how they may use this activity in their own classrooms. Table 2 displays a few examples.

Table 2

Participant Reflection Quotes from Chat

Participant	Quote from Reflection
Elementary In-Service Teacher	"My favorite take-away was the fraction clothesline and fraction tracks. I used them when I taught 4th and 5th grade, but never thought of adapting them for lower grades."
Middle School In-Service Teacher	"There are so many different interactive/activities that can be open to a broad range of students. You could have beginning elementary just beginning to see a fraction or you could have older middle school students taking fractions further."
Middle School Preservice Teacher	"My favorite big idea from this module is comparing to benchmark fractions (1/2 and 1), that is something that I had never done before and it makes so much sense! I really enjoyed learning about this."
Middle School Preservice Teacher	"My favorite takeaways from this module were unit fractions and common numerators when comparing fractions. I had only worked with common denominators before, that I can recall."

IMPLICATIONS

Although it may look different than face to face course interactions, engaging in well planned collaborative learning through synchronous online class activities as described here encouraged course participants to practice reasoning and problem solving and engage in meaningful mathematics conversations. The following implications may help guide the development and implementation of course activities that encourage this type of interaction in the virtual classroom.

1. Intentionally plan the use of rich, open-ended mathematical tasks that are structured in a way to support interactions. Select tasks with more than one path to a correct answer and that encourage participants to listen to and reflect on each other's solution strategies (NCTM, 2014).
2. Increase the opportunities for interaction and offer multiple ways to interact (breakout rooms, emoticons, chat, etc.) (McBrien, Jones, & Cheng, 2009). Instructors will benefit from introducing participants to the tools that are available in the online interface early in the course. For example, suggesting that when participants finish solving a task they click the check mark so that the instructor knows they are ready to discuss it. For the activity described here, working on a task in breakout groups activated participants' prior knowledge and developed confidence in their responses prior to placing a number on the clothesline in front of the whole class.
3. Encourage *all* participants to contribute to large group discussions through questioning and use of online interface features (Slagter van Tryon & Bishop, 2009). For example, instructor questions and observations in the breakout group and whole class setting encouraged participants to develop and apply mathematical reasoning. In addition, the whiteboard feature allowed participants to engage in problem solving similar to how they expect their students to participate. Participants responded to each other's work using emoticons and the chat window.

The more opportunities that in-service and preservice teacher participants have to engage in online discourse and problem solving, the more likely they are to use the strategies with their students. In addition, they remain engaged throughout the entire class and develop professional, collaborative relationships with their classmates.

FUTURE RESEARCH

Mathematics education research supports the need for students to develop their ideas and learn from each other (NCTM, 2014). By using the available features of online interfaces, synchronous online instructors can encourage the application of these strategies with teacher participants and their students. In return, participants can draw on their experiences with K-8 students to contribute to discussions in meaningful ways. The examples provided in this brief report describe some strategies that can be applied to other mathematics topics and classrooms at various levels. In addition, they can be used in other subject areas such as collaboratively creating maps in social studies or completing concept maps in language arts. For future research, I plan to seek out rich, open ended tasks that encourage this level of interaction in each synchronous meeting to see if it can be maintained throughout the entire course. In addition, participant reflections on their mathematical and pedagogical understandings gained from participating in these course activities will assist in evaluating their effectiveness. Research should continue to provide mathematics educators with information related to effective discourse strategies in online settings to establish a source of best practices.

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Bidirectional Benefits from School to Home Literacy Practices in the Early Childhood Virtual Classroom

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School literacy practices are shared with parents and caregivers as they assist children with schoolwork in the home. With purposefully designed shared activities these activities become bidirectional as teachers gain information about families' funds of knowledge and home literacy practices. When classroom instruction is delivered electronically, the technology provides a bidirectional window into both the school and the home. Teachers learn how multiple family members construct knowledge with the child around the school literacy activities as would happen in the traditional classroom with their peers. With bidirectional projects that mimic classroom practices and give the early childhood teacher culturally relevant information about families, the teacher-parent relationship can become a true partnership.

INTRODUCTION

School to home literacy has never been as important as in our current health crisis as early childhood educators are asked to provide families with literacy activities that mimic classroom practices. Teachers, parents and caregivers are developing new relationships around school and home literacy practices. Fortunately, when embraced from a transformative approach (Banks, 1997), this new dynamic can offer parents, caregivers and teachers insight into the two learning systems—school and home literacy.

Despite the importance of home-school partnerships for children's academic success, aspects of family engagement are seldomly covered in teacher education programs, leaving many new teachers feeling inadequately prepared to work with parents and caregivers (Weiss, Kreider, Lopez, & Chatman, 2005). Culturally relevant pedagogy suggest bidirectional activities, those that share methods, traditions and practices in the two settings, will inform not only the family about schooling practices but also the teacher about what, with whom and how best the child interacts with home literacy practices (Fox, 2016; Gay, 2002; Moll, 2019). Parents and caregivers will have learned new skills by the end of the current crisis and school closures, based on what teachers have developed through online learning strategies. Teachers too can learn more about the child and family through these same outreach strategies by utilizing the cultural and cognitive resources of the home and through carefully designed bidirectional work (Fox, 2016). This additive-- *funds of knowledge--* approach helps teachers to see the home as an untapped resource for academic instruction while at the same time trusting parents and caregivers as true partners in the child's development (Moll, 2019; Moll, Gonzalez, Amanti, & Neff, 1992).

INNOVATIONS

Following are three examples of early childhood classroom practices modified to fit the home learning environment and contribute to the virtual bidirectional classroom. In these activities, teachers and families share the responsibility, forming a bidirectional learning partnership (Fox, 2016; 2020) that may include classmates, parents, siblings and other caregivers.

Bidirectional journal writing

One example of a traditional bidirectional homework practice is the classroom mascot, such as a teddy bear, with a journal that goes home with a different child each day. When the teddy bear returns to the classroom the child shares their overnight adventures with the class. To modify this activity for the virtual classroom, an electronic journal, such as Penzu (https://penzu.com/,) can be created by the teacher and shared as a class writing project. This shared—or collective—form of writing mimics the collective form of family literacy shared in many cultures and homes (Fox, 2016).

Bidirectional literature response

A second example of an innovation that promotes bidirectional learning is in literature response. This traditional oral and written comprehension strategy, called Higher Order Thinking Skills Questions or H.O.T.S. questions, is based on Bloom's Taxonomy (Bloom et al., 1956) adapted for critical thinking (Ferlazzo, 2009). Just as good question techniques in the classroom prompt knowledge construction through rich discussion and writing, H.O.T.S. questions can prompt family discussions that contribute to the classroom, facilitated by literature selections. Through virtual classroom instruction, the teacher models how to choose one question in preview to a story or chapter. The book is then read electronically either by the teacher or from one of many online story choices and followed up with either virtual discussion, written response or in a collective journal. Along with daily story recommendations, the teacher can send a H.O.T.S. question prompt or encourage the parent, caregiver or child to choose the question.

Bidirectional discourse through classroom meetings

Since Holdaway's seminal research on the benefits of early family literacy practices, mimicking the home setting in the early childhood classroom has been an important practice to support early literacy (Holdaway, 1979; Nicolle-Hatton, 1992). Shared reading using the big book format promotes interactive writing and discussions around texts, such as would happen in the home with parents and caregivers (Burkins, 2013). Bean bag chairs, cozy reading corners for sharing books in close proximity among peers and time for independent reading of books of choice are promoted practices in grades K-8 (Atwell, 2007; Boushey & Moser, 2014). One early childhood teacher flipped this classroom practice and brought objects from her classroom to create the school setting for her virtual classroom. Knowing the school would be closing, she brought manipulatives, the classroom calendar, and the easel from her classroom. She brought stuffed animals, plants, a bean bag chair and rug from her reading corner. She set up a space in the living room of her apartment to simulate the classroom with the camera focused there. With these innovations she acknowledged the importance of the daily routine and modeled the comfort of the consistent classroom experience that is so important to this age.

RESULTS

When teachers work to meet the needs of their learners innovations happen. In the modifications to traditional practices described here, teachers provided children with "mirrors, windows and sliding doors" (Harris, 2007; Simms-Bishop, 1990) through virtual home visits. With the bidirectional activities described here children had "mirrors" into homes that both looked like their own and "windows" into others to enable learning about different practices from the child's perspective. This learning within what Vygotsky called the "zone of proximal development," is a natural scaffold for the young learner (McLeod, 2019). Additionally, the teacher is informed in the same way, with the bidirectional practices providing a mirror and a window into the family literacy practices combined with the school practices.

Classroom mascot: Bidirectional journal writing and sharing

At a recent professional development seminar focusing on innovations in response to school closures, forty early childhood teachers brainstormed ideas of how to update the classroom mascot and journal activity for the virtual classroom. Teachers worked out how to turn this practice into a collective writing activity that would share information from the home and encourage writing to be shared among the children. Instead of the mascot going home with each child, the teacher uses the teddy bear as a greeter each time the virtual classroom opens, reading from the electronic journal about events with the teacher and foreshadowing the day's lessons. The children then take turns with one child each day introducing classmates to a stuffed animal or toy from home. The teacher creates a shared electronic journal, using free apps such as Penzu (https://penzu.com/) and the day's child and stuffed animal write and draw about their day. The child, along with a family member, records the activities through the eyes of the stuffed animal. Photos and graphics can be inserted. As the electronic journal is open to the class, teachers and families to read, it becomes a bidirectional tool for learning about family cultures and practices. Figure A: Two Versions of a Classroom Mascot journal shows the more traditional version that would be sent home to each child and an electronic version which is shared electronically.

Traditional class mascot journal	Online class mascot journal https://penzu.com/journals/
	  My mom said I could have a birthday party for Teddy. He wants to invite my baby sister's Lionel. We made pretend cookies and put pink sprinkles on them. We pretended to blow out candles. I made invitations and hats too. We blew bubbles.
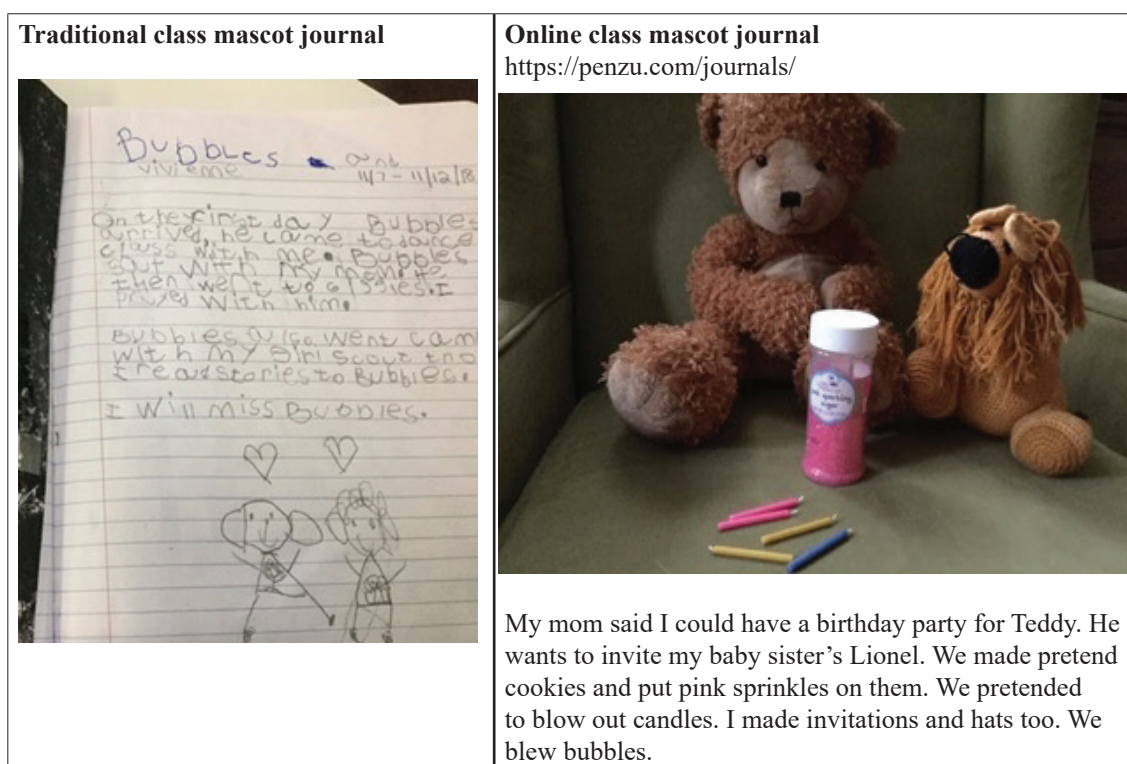
Figure A. Two Versions of a Classroom Mascot Journal.

A final idea for the mascot and journal brainstormed by the participating teachers was a reunion of the at-home mascots once the children return to school or at the end of the school year. At that time, pages from the electronic journal can be printed and displayed in the classroom.

H.O.T.S. comprehension questions: Bidirectional literature response

In order to encourage comprehension with critical thinking, what Donald Finkel suggested as taking more control over understanding (Finkel, 2000), higher order thinking skills questions (H.O.T.S.) for literature response can be practiced in both the home and school. Just as in the classroom, the questions can be printed or viewed from a screen. Figure B: H.O.T.S. Question Cards shows the two formats and example H.O.T.S. questions.

What part of the story is the funniest? Why?	What part of the story is the saddest? Why?	What part of the story is the scariest? Why?
If you could take one of the characters to a park to play with, who or what would it be? Why?	If you could go to where the story takes place, would you go? Why or why not?	If you could buy a gift for one of the characters what would you buy and for whom? Why?
Was the main character good or bad? Why?	If you could switch places for one day with a character in the story, who would it be? Why?	How are you just like the character in the book?

Figure B. H.O.T.S. Question Cards.

In the virtual classroom, the teacher modeled how to choose one question for the story (or chapter). Along with the story recommendation for the day, the teacher can send a H.O.T.S. question prompt or encourage the parent, caregiver or child to choose the question. The book is then read electronically either by the teacher or from one of many online story choices, such as Mondays with Michelle Obama Storytimes, (https://www.youtube.com/watch?v=ShaO355bpDQ&feature=emb_title). Table 1: Electronic Book Titles with Suggested H.O.T.S. Questions gives examples of question prompts with suggested titles.

Table 1
Book Titles with Suggested H.O.T.S. Questions

Book Title, Author & Illustrator	Electronic Source and Link	H.O.T.S. Question
The Very Hungry Caterpillar Eric Carle	Mondays with Michelle Obama Storytimes, PBS https://www.youtube.com/watch?v=sqpWHU778_Y	What part of the book can be true and what is make believe? How do you know?
Miss Maple's Seeds Eliza Wheeler	Mondays with Michelle Obama Storytimes, PBS https://www.youtube.com/watch?v=ShaO355bpDQ&feature=emb_title	What can you do just like the character in the book?
Barn Dance, Bill Martin, Jr. Ted Archambault	Reading Rainbow https://www.youtube.com/watch?v=MElPrvT0IwU&list=PLWzvUJB81RLKPjg6jJqUyxmoizzApfc9o&index=69	Was the main character of the story good or bad? Why?
The Little Engine That Could Wally Piper Dan Santat	Imagination Library https://imaginationlibrary.com/goodnight-with-dolly/	Which of the characters would you like to be? Why?

Book Title, Author & Illustrator	Electronic Source and Link	H.O.T.S. Question
Last Stop on Market Street Matt de la Pena Christian Robinson	Imagination Library https://imaginationlibrary.com/goodnight-with-dolly/	What page is your favorite? Why?
Stellaluna Janelle Cannon	Reading Rainbow https://www.youtube.com/watch?v=-MoHyQUmXrU&list=PLWzvUJB81RLKPjg6jJqUyxmoizzApfc9o&index=73	Are there bats in your neighborhood? How do you know? What is the best time to observe? Tell a story about watching for bats.
Ungifted Gordon Korman	Epic https://www.getepic.com/app/read/66633	What part of the story (or chapter) was the scariest? [funniest? Saddest?] Why?
The Other Side Jacqueline Woodson E.B. Lewis	Epic https://www.getepic.com/app/read/14170	If you were the main character, what would you do the same and what would you do differently? Why?
Sir Cumference and the Fraction Faire Cindy Neuschwander Wayne Geehan	Epic https://www.getepic.com/app/read/39504	What was your favorite page of the book? Why?

With Reading Rainbow, Epic and the Dolly Parton read alouds, the book pages are read and viewed with voice over. With the Mondays with Michelle Storytimes, the reader, in this case Michelle Obama, is viewed during the reading. With the classroom teacher performing the read aloud, she or he is likely visible holding the book. Families can choose which of the two styles is most appropriate for their child on any given day. By providing the link children can revisit the story multiple times and then send a brief written response to the question before the next class meeting through a daily google document so that the children construct the responses together, just as they would in the classroom. In this way higher order thinking skills are practiced and responses are shared from the home.

Class morning meeting: Bidirectional construction of knowledge

One classroom teacher had the foresight—and opportunity—to recreate her physical classroom in her apartment, thereby replicating the visual routine for the virtual classroom. In a webinar discussion among teachers, she told the story of how she leads a virtual classroom morning meeting. For the morning message, just as in class, she writes as the children watch and asks for volunteers to help her sound out words, add punctuation and read aloud. For calendar math, using her classroom white board she writes the days date as the children watch. Modified from the classroom where she would have called on individual children to come up and write the equation on the board, she challenges the children to write an equation for the number on paper or a white board—or their hands. For the day's date she uses the virtual abacus to check the equations. Learning that one child was disappointed when he could not move the beads on the classroom abacus for his birthday as he would have done in their traditional classroom, she discovered an electronic abacus that she now uses for this birthday activity (https://toytheater.com/abacus/). She shared how after the class's counting to 0-5 in unison the little boy hugged the screen to his chest, showing he felt the connection between his classroom practices, his teacher and his home.

IMPLICATIONS

A positive outcome from school closures is the bidirectional opportunity for teachers, parents and caregivers to work together to *provide* and *share* learning strategies and experiences. Research has shown that preservice teachers view working with parents as one of the most challenging aspects of beginning the profession, yet it is often not covered to the extent needed in teacher preparation programs (Epstein, 2018; Ferrara & Ferrara, 2005; Weiss, Kreider, Lopez, & Chatman, 2005). As universities design programs of study for preservice teacher training and school districts provide professional development for inservice teachers, a change of focus is warranted.

Teacher training programs can implement a more culturally relevant curriculum by including courses and assignments that acknowledge the cultural characteristics, experiences and perspectives of children and families as important components of a child's classroom experience (Gay, 2002; Holdaway, 1979). This is particularly true in that data across regions shows that beginning teachers are more likely to be placed in rural areas with less resources or high poverty schools in urban areas (Gagnon & Mattingly, 2010). A 2018 Department of North Carolina report stated that children "… in these high-poverty, high-minority schools have a greater probability of receiving instruction from an inexperienced or out-of-field teacher than the students in schools with lower poverty levels" (Hui, 2019). Unfortunately previous programs of study and professional development emphasized a deficit approach to parent training and the need to increase involvement at school, particularly for minority language, race and low-socioeconomic parents. Learning from the current experience of working in consort with parents and caregivers from all backgrounds, economic and education levels, an emphasis on ways for teachers and school administrators to discover untapped resources in homes and neighborhoods through community engagement should be considered for both inservice teacher professional development and preservice teacher training (Barbour, 2014; Epstein, 2018).

With the transition to virtual teaching, those teachers with skills and strategies in place for working with technology were at an advantage. Attention to bidirectional activities that connect what parents and caregivers currently do to support learning with traditional in-school practices can be included in the design of the virtual lessons, as in the redesign of the mascot and journal writing given above. Classroom activities that promote academic oral, auditory and written comprehension can take place in the home, with the responses shared with the class on the screen, as in the H.O.T.S. question responses to audio literature choices described above. Using electronic materials and tools in the home can provide hands on experiences that mimic classroom practices, as with the abacus, online journal and white boards discussed above. Teacher preparation programs typically expect students to use technology to submit assignments, including designing classroom lessons that include technology. Broadening these assignments to now include virtual lesson design is needed. An example of this would be for students in their internship semester to work with their partnership teachers to redesign a homework lesson to make it both bidirectional and shared virtually among the class, just as the inservice teachers brainstormed how to convert the classroom mascot into a virtually shared homework practice.

Current school closures have forced teachers to co-teach alongside parents and caregivers. Recent media reports show that bus trips and teacher car caravans going to school neighborhoods have given administrators and teachers opportunities to socially connect with children and families (Rodriguez, 2010; Slater Tate, 2020). The virtual classroom gives teachers opportunities to conduct a virtual home visit by routinely connecting the two sites---the home and school setting—with a chance to learn more about resources in the home, including siblings and other family members as "more capable peers" (Roberts, 2016; Vygotsky, 1935). Experiences such as these not only show children and families the connection teachers feel for the children, but also provide teachers with a window into the families and communities of those they teach. Continuing these practices, whether seen as preparation for the next school closures or as routine activities, will give teachers and families insight into how to build on the learning environments of home and school. Providing preservice teachers with training and rationale for these bidirectional experiences with parents and caregivers will serve them well as they continue in the profession,

FUTURE RESEARCH

Almost daily we hear someone in the media says "Wow! I never realized how hard teachers work." Future research can reveal the changing dynamic between parents, caregivers and teachers following the disruption and subsequent modifications that developed around school to home literacy practices. A strand of this inquiry will need to look at how trauma from the sudden loss of connection, increased pressures in the home from economics and health perspectives, and social emotional effects on family dynamics impacts academics and other aspects of child development. A recent report on the effects of sudden school closures featured the unanticipated outcomes on teachers from the transition in instructional delivery methods (Moody, 2020).The author, the superintendent of the featured school district, described her teachers as being exceptionally well prepared for the transition from traditional to virtual in-home classrooms. What she noted, however, was that in spite of the 6 years of preparation there remained issues of concern for teachers. Number one on the list was exhaustion. This too will need to be examined…how teachers, parents and caregivers can be emotionally, economically and physically sustained in situations such as our current crisis.

One positive outcome from recent school closures is an increase in parents' understanding about what teachers do. This change reflects not only an appreciation for how hard teachers work but also acknowledgement of the variety of tools, methods and practices teachers use on a daily basis to build literacy across the content areas. Hopefully research can likewise reveal that teachers learned more about home literacy practices, including ways to embrace the partnership to its fullest extent. The key is to use this moment to connect school and home practices, encouraging bidirectional learning and relationship building.

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Best Practice to Teach Kindergarteners Using Remote Learning Strategies

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How do you provide quality and effective learning experiences for primary- aged students in a rural setting when remote learning is the only option during a world- wide pandemic? This chapter features a best practice of how a school and kindergarten teacher managed this unique situation and enabled 21 kindergarten students to achieve quality learning through a creative blended learning mode designed for at- home learning. The text describes how educators worked with parents to address their concerns as well as addressing digital divide challenges. Lessons learned and a variety of learning activities are shared.

INTRODUCTION

The COVID-19 pandemic has resulted in unprecedented schooling experiences for both teachers and students, shifting from traditional face- to- face learning in classrooms to remote learning at home for most PK-12 schools in the United States. The purpose of this chapter is to present a best practice of how a school and kindergarten teacher managed the situation to bridge the digital divide and enable 21 kindergarteners to learn as much as possible in a creative blended learning mode. This instructional delivery approach not only ensured that students complete quality work as they usually did in the classroom, but also met the American Academy of Pediatrics 2018 guideline on limited screen time for kids (AAP, 2018).

INNOVATION

School Administration's Responses

Like many other small, rural, public schools in the Midwest, Amherst Elementary School faced a rapidly- evolving pandemic situation that was sweeping across the United States in March 2020. To prepare for the foreseeable situation of remote learning, the school asked students to bring home a note explaining the pandemic circumstance, a description of the possible new model of blended learning with iPads, and a survey about Internet access at home. Based on the parents' survey response, the school provided Internet hotspots to those families that did not have Internet access. This was the very fundamental step for the school administrators to make sure that every student had access to learning resources from home, bridging the digital divide between those who had Internet access and computing devices and those who did not as recommended by researchers and educators (Block, 2010; Williamson, 2013). From the teachers' side, the school administrators asked teachers to plan on the probable situation that their students would not be back at school after Spring Break and to send them home with needed texts and materials to ensure learning could continue at home.

Teacher's Reponses

Based on school administrators' updates, the kindergarten teacher sent the kids home with learning materials so she would still be able to instruct them while the school were closed. She decided to use blended learning model including asynchronous and synchronous sessions. The asynchronous learning offered the kid control over their learning. It was also convenient and flexible for their parents to help them with assignments during the isolation time. The students completed their paper-based assignments/activities (as they usually did in class), took photos of their assignments (with their parents' help), and then uploaded pictures of assignments/activities onto *SeeSaw* (https://web.seesaw.me/) where the teacher graded them as illustrated below.

Subject	Monday	Tuesday	Wednesday	Thursday	Friday
Reading	Read Storybook pgs. 104-106 Worksheet 131	Read Storybook pgs. 107-109 Worksheet 132	Read Storybook pgs. 110-112 Worksheet 133	Read Storybook pgs. 113-115 Worksheet 134	Read Storybook pgs. 116-118 Worksheet 135
Language	IXL: E. 2 E. 3	IXL: F. 1 F. 2	IXL: F. 3 F. 4	IXL: G.1 G. 2	IXL: G. 3 G. 4
Math	Lesson 124	Lesson 125	Lesson 126	Lesson 127	Lesson 128
Science	https://mysteryscience.com/pushes/mystery-2/pushes-pulls-work-words/136?code=NDIyMzAxMzc&t=student			Work through lesson and Mystery Science worksheet (my favorite machine is) by Friday. Please upload a picture to SeeSaw.	
Social Studies	Studies Weekly: Studies Weekly 22-Read through it and complete the back. Upload picture of back onto SeeSaw.				

Assignments in Pink are optional.

-I will be adding activities and videos to SeeSaw. Those also will need completed! There will be videos that go along with some of the lessons, especially math.

Figure 1. Screenshot of Weekly Learning Activities.

For the synchronous sessions, the teacher hosted weekly video meetings via *Zoom* (https://zoom.us/) with her students every Thursday at 10:00 a.m. She also made sure that each synchronous session was no longer than one hour as recommended by the American Academy of Pediatrics 2018 guideline on limited screen time for kids. During Zoom meetings, they discussed questions and concerns, played a scavenger hunt, and did show-and-tell as well as book readings. The benefits of having those live online sessions included her students 1) having a greater sense of community and connection to their peers when they all learned together during this time of isolation, and 2) becoming more engaged in their learning.

In addition, the teacher made videos to supply instruction and maintain the relationship between herself and the students. She sent greetings, read books, and also shared videos of other things happening in her life like the one she posted on YouTube at the following link: https://youtu.be/SLSu1fgC1lM.

To ease parents' anxiety, the teacher allowed parents to access their children's work on *SeeSaw*. She also texted, called, and used *ClassTag* (https://home.classtag.com/) for announcements throughout the remote learning process. The teacher contacted each parent individually asking how things were going and if the workload was appropriate. She also provided parents with a list of additional learning resources for students as shown in Table 1.

Table 1

List of Additional Weekly Learning Resources Created by the Teacher

Reading	https://youtu.be/Y3dwfsPARSI
Math	https://youtu.be/489qwALfMYI
	https://youtu.be/1Uma2PA_zO4
	https://youtu.be/bkm8LIN4Am4
Brain Break	https://www.youtube.com/watch?v=CJGMq1HNjpY&t=42s
Read Aloud Resources	Little Blue Truck- https://www.youtube.com/watch?v=nz7iPhxmhVI
	Nibbles, The Book Monster- https://www.youtube.com/watch?v=DSa-oo_OCBw&t=4s

RESULTS

Although no formal data was collected to evaluate the effectiveness of this instructional practice, anecdotally the teacher reported that the quality of her students' work at home using remote learning strategies was similar to that in the regular classroom. Students enjoyed chatting and maintaining friendships with each other during the Zoom sessions. They were also engaged in the Zoom sessions. Based on feedback from parents, 18 of 21 parents indicated that remote learning was going well for their child. This creative blended learning mode with diverse and fun activities echoed what researchers and educators suggested as remote learning best practices for teachers during the pandemic (Gerencer & Hayes, 2020; Husain, 2020).

School administrators' timely and appropriate responses to the rapidly- evolving pandemic situation by allowing students to bring home iPads, checking students' home Internet access, and providing Internet hot spots where needed, made remote learning at home possible. One of the main concerns of using remote learning for all students was the digital divide that may widen the learning gaps among students (Gross, 2020; Isensee, 2020; Strauss, 2020). The school administration's actions to survey families regarding home Internet access, send home devices with all students, and provide hot spots where needed helped bridge the digital divide between students who had and those who did not have devices and/or Internet access at home.

While reports about positive impact of blended learning on students' performances were often either focused on college students (Bern, 2011) or middle/high school students (Watson et al., 2013), our preliminary findings are about kindergarten students. Although more research evidence is needed to confirm our preliminary findings, it is suggested that blended learning activities contributed to the quality work students achieved during this pandemic and was also reflected in feedback from parents regarding their children's learning while at home.

IMPLICATIONS

This creative blended learning mode with diverse and fun activities designed by an elementary teacher was in line with what researchers and educators suggested as remote learning best practices for teachers during the pandemic (Gerencer & Hayes, 2020; Husain, 2020), and had several implications for P-12 schools and in-service teachers. It may also be replicated on snow days when students are unable to attend school. Specifically, schools and in-service teachers may create online learning courses via SeeSaw or any other free learning platform such as Google Classroom where teachers can post and share instructional materials for students to access and submit assignments if they can not attend school. For the synchronous sessions, they can use any videoconference platforms such as Zoom, Microsoft Teams or Google Hangouts for teachers and students to interact with each other. Also as recommended by the American Academy of Pediatrics 2018 guideline on limited screen time for kids (AAP, 2018), the synchronous sessions should not be more than one hour long.

The teacher in this case study did not record her Zoom sessions because she did not have parental consent for video recording during that urgent time. We recommend that live sessions should be recorded especially for upper level classes

so that students can watch on their own time. Few of the students may not attend the sessions or cannot catch up with the live sessions. The recordings will ensure students have the access they need to critical content. This practice is also highly recommended by educators and researchers (O'Callaghan, Neumann, Jones, & Creed, 2017; Williams & Hancock, 2012).

Finally, timely and regular communication among stakeholders including school administrators, teachers, students' parents and students is the key to any educational success (Hara & Burke, 1998). In this case, both the school and elementary teacher made early and regular contact with students' parents and students to ease their anxiety and have a successful transition from classroom learning to remote learning at home.

FUTURE RESEARCH

Future qualitative research to understand the impact of remote learning practices on kindergarten students' academic and social development is necessary. Interviewing teachers and parents of kindergartners would provide insight into the development, or lack of development, they observed during this time of remote learning. Interviewing 1st grade teachers in 2020-21 would provide a glimpse of how well students were prepared for the next grade. Combining qualitative studies with quantitative measures of early learning skills would provide a well-rounded picture of the impact of remote learning on kindergarten students and their learning during this pandemic and stay at home orders.

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Building on Existing Brick-and-Mortar Practices in Online Spaces

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The current COVID-19 crisis is forcing many schools and universities to quickly consider how to transition to online teaching. We propose that much of the knowledge and expertise educators have already developed in traditional brick-and-mortar classrooms can be useful in online teaching environments as well. In fact, there are a number of parallels between effective pedagogy in traditional classrooms and elements of the Community of Inquiry (COI) Framework (Garrison et al., 2000), commonly utilized in describing effective online teaching in higher education. However, careful adaptations are required to take into account the unique nature of online interactions.

INTRODUCTION

Most educators have already developed a repertoire of effective strategies for teaching in traditional brick-and-mortar classrooms. Rather than positioning online teaching as a completely new skill set, we can help teachers leverage what they already know by identifying specific adaptations and considerations for the online environment. As a consultant invited to support a small, private K-6 school to transition to online learning, this framing was helpful in relieving teachers' anxiety towards utilizing technology to deliver distance education. Because the school's philosophy was based in experiential, hands-on learning, technology had not been a focus of previous professional development and many teachers were unsure how they would be able to deliver the same quality instruction to students in a virtual environment.

Using the Community of Inquiry (COI) framework (Garrison et al., 2000), a commonly utilized framework in describing effective online teaching in higher education, a professional development session was provided for the teachers to support them in thinking about how to move forward with online instruction. The consultant led one introductory two-hour session with the teachers and school leaders, and then had weekly or biweekly follow-up meetings with the school leadership, who met with teacher teams throughout the week, to provide additional suggestions and guidance to questions or issues that arose as the semester progressed.

INNOVATION

During the introductory professional development session, teachers were invited to consider how they could adapt their existing practices to online spaces. The consultant began by asking teachers to brainstorm, "What are things you want to be able to do with your students as we transition to online learning?" and "What are you good at as a teacher?" Overwhelmingly, the responses connected to elements of the COI framework (e.g. "stay connected as a community," "continue learning about….", "making sure we meet the needs of our special education students"), and teachers indicated skills related to building classroom community, how to plan and design instruction, and facilitating and monitoring learning.

These ideas map onto the ideas of social presence, cognitive presence, and teaching presence as developed in the COI framework, even within the K-6 environment. Specifically, building classroom community relates to the idea of de-

veloping "social presence"; lesson planning and design refers to the "cognitive presence" or how teachers can facilitate the construction of knowledge; and facilitating and monitoring learning is akin to the idea of "teaching presence" which is the direction and facilitation of processes to achieve the desired learning outcomes (Garrison et al., 2000).

Anderson (2004) suggests that educators should be able to adapt existing learning theories and practices online, utilizing the COI framework to identify the unique contexts of online learning. As such, teachers can leverage technology, including the use of multiple information sources, access to a repository of content, and multi-modalities, with what they already know about teaching and learning.

In the area of **building classroom community**, or developing a social presence, we were able to leverage the work teachers typically do at the beginning of the school year to create a safe, collaborative culture. Just as teachers develop norms and procedures for their classroom when they begin the year, it was important for them to explicitly revisit these ideas and adapt them for how their class would function in the online environment. We began by talking about the specific norms and procedures they would introduce at the beginning of the school year, and then, we asked teachers to examine how existing norms would be similar or different in the online environment. For example, teachers revisited procedures and routines for synchronous discussion, asynchronous work completion, and student-student and student-teacher communication.

Another area of focus was leveraging teachers' expertise in **planning and designing units and lessons**, or developing the cognitive presence of a course. When teachers plan their instruction, they typically considered how to break down objectives into mini-lessons or multiple activities, utilizing a variety of modalities and participation structures (e.g. utilizing Wiggins & McTighe's (2005) Understanding by Design approach). In adapting to online instruction, we asked teachers to think about how to break down a lesson into multiple online activities, balancing assignments between asynchronous (independent) and synchronous (together online) work. Similar to the need in brick-and-mortar planning to balance individual and collaborative work, we helped teachers examine their upcoming units/lessons and consider which activities could be grouped for independent learning and which required live interaction and discussion, and when to use small group discussions versus large group or individual instruction. We were then able to suggest specific online tools and strategies to support individual and collaborative work, both synchronously and asynchronously, to match their needs.

Finally, teachers are experts at **facilitating and monitoring learning**. As teachers deliver their planned instruction, they have to assess student learning and then adapt their instruction to meet the needs of their students. Again, by asking teachers how they would normally utilize strategies such as formative and summative assessments in their classrooms, we were able to suggest alternatives in the online environment. For example, teachers who used post-it notes and chart paper could utilize Padlet; teachers who wanted students to give short presentations were introduced to FlipGrid. In fact, some teachers found that online tools actually provided some affordances that had not previously been possible, such as tools that provided instant feedback and automated grading (e.g. Kahoot), and greater opportunities for differentiation and self-paced instruction.

RESULTS

By acknowledging and starting with teachers' existing expertise, we were able to reduce the anxiety and stress of moving to online learning and teaching. Although there was initial resistance to online teaching and technology, teachers with strong teaching pedagogy prior to the school closures, were able to quickly transition. In fact, we saw these teachers able to go beyond what they initially planned to do, and more willing to try new tools and strategies. Unfortunately, we also found that teachers who were struggling in their classrooms prior to the transition continued to struggle or even struggled more because they did not have a strong existing "tool-box" to utilize. However, this became an opportunity for school leaders to support these teachers under the new paradigm of online teaching, which ultimately can improve their overall teaching pedagogy.

IMPLICATIONS

Often when teachers receive professional development in the area of instructional technology, the focus is on apps and tools, rather than how to utilize technology to support instruction (Lawless & Pellegrino, 2007). This focus can make teachers anxious and hesitant about moving to the online environment. However, by focusing on what teachers are com-

fortable with and doing well, school leaders can reduce anxiety, acknowledge the existing expertise of teachers, and focus on developing appropriate instructional designs to reach their learning objectives.

As we continue to support teachers to develop expertise in online teaching, professional development providers can begin with the COI framework as a way to incorporate different aspects of instructional design, while building on teachers' existing knowledge. As detailed in our Innovations section, teachers should consider ways they normally would build their classroom community, and then adapt those strategies to the online environment, such as a morning meeting via Zoom ("social presence"). To develop their "cognitive presence" in the online setting, teachers should begin by examining existing lesson plans and activities, and chunk them for online delivery; and likewise, as teachers create their "teaching presence" to assess and monitor their students' learning, they can be provided with tools that work similarly in online spaces. Often, these tools can be as simple as utilizing already familiar technology (e.g. sharing a photo or video). However, as teachers try new tools, they may also discover additional affordances of technology that enhance the traditional ideals of interactivity, adaptivity, and feedback in the classroom (e.g. Box 8.1 in National Academies of Sciences, Engineering, and Medicine, 2018). But, by ensuring that technology professional development aligns with existing practices, technology integration can be more successful (Fishman & Dede, 2016).

In addition, utilizing the COI framework can support school leaders in providing instructional leadership, even in the absence of strong instructional technology expertise. In this instance, utilizing a consultation model was cost-effective for the school since they did not feel they had adequate instructional technology skills amongst the staff. However, school leaders were still able to observe teachers and ask probing questions, utilizing their existing instructional leadership skills and expertise, while utilizing a consultant for more specific online instructional design questions.

FUTURE RESEARCH

Based on our experience with transitioning teachers to online instruction, we believe other administrators and professional development providers can begin by acknowledging the expertise teachers already utilize in their brick-and-mortar classroom as a starting point to integrate components of online teaching as outlined in the COI framework. However, future research can determine specific areas that may require more or less support to move to the online environment. In addition, although this project focused on the role of the teacher, future research can provide insights into how school leaders can leverage their existing skillset to support online teaching and learning, even in the absence of a strong instructional technology background.

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Community and Collaboration

Professional Learning under the Pandemic: A Self-Study of Five Teacher Educators' Experiences of Transitioning to Emergency Remote Teaching

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The COVID-19 pandemic forced universities and schools to close campuses and pushed faculty and teachers to deliver instruction remotely. The challenge faced by teacher educators was two-fold: getting prepared to teach online and modeling online teaching for their students who are pre/in-service teachers. The steep learning curve and the amount of pressure on teacher educators to quickly transition to remote teaching were immense challenges. This paper shares five teacher educators' professional learning experiences within a self-initiated professional learning community during their transition to remote teaching. The findings suggest a few elements contributing to the success of a professional learning community and identify some emerging needs for professional development in the new world of distance learning.

Keywords: remote teaching, professional learning, teacher educators

INTRODUCTION

"[The university] will move to teleworking after spring break... I will need a plan … how you will teach from home... Please submit your plan by Friday, 3/13."

This was a message a teacher educator at a mid-Atlantic university received on March 10, 2020, indicating the limited amount of time that faculty had to transition to remote teaching due to the COVID-19 pandemic. How would teacher educators succeed in this transition? A formal professional development (PD) that typically focuses on developing faculty's expertise in discipline research (Gaff & Simpson, 1994) is neither adequate nor efficient in preparing faculty for drastic changes. As a way of PD, five teacher educators formed a professional learning community (PLC), hoping it would foster "mutual cooperation, emotional support, and personal growth as they work together to achieve what they cannot accomplish alone" (DuFour & Eaker, 1998, p. xii).

INNOVATION

This paper reports a self-study of five teacher educators' professional learning experiences during their transition to *emergency remote teaching* (Hodges, Moore, Lockee, Trust, & Bond, 2020) through a self-initiated professional learning community (SIPLC). Self-study is "the study of one's self, one's actions, one's ideas, as well as the other" (Pinnegar & Hamilton, 2009, p. 266). It focuses on the improvement of professional development and practices in the field (LaBoskey, 2004). Adopting this widely practiced research method among teacher educators (Hamilton & Pinnegar, 2013), the study aimed to deepen the understanding of teacher educators' experiences in the SIPLC as they transitioned to remote teaching under the pandemic.

The formation of the SIPLC involves three interrelated stages (Figure 1): the seed planting stage, the triggering event, and the transformation stage to SIPLC. Prior to the study, the five teacher educators had an informal social group where they casually chatted about life and work. They frequently shared experiences and resources in their online social group, and occasionally met for lunch. The existing close relationship among the five teacher educators helped build trust during the seed planting stage for the formation of the SIPLC. The pandemic, as the contextual force, demands internal changes of the social group to respond to the external challenges. The triggering event for the group to transform into a SIPLC occurred when a member started a Zoom gathering intended for social support due to the pandemic, which turned into a discussion on how to teach online. After this Zoom meeting, the informal social group naturally transformed into a SIPLC where they collaboratively and individually shared and reflected on their professional learning experiences.
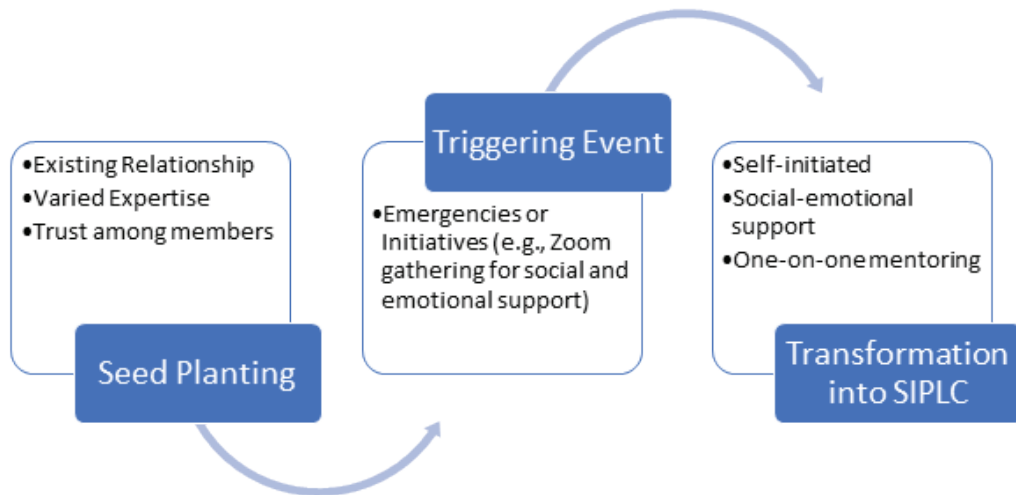
Figure 1. The Formation of the SIPLC.

The structure of the SIPLC is hybrid (see Figure 2). There are postings of questions and answers (Q&A) in their on-line chat group, scheduled weekly live meetings (via Zoom or WebEx) to share and discuss their success and challenges during their transition, and a shared Word document to record the benefits and challenges of remote teaching and their experiences in the SIPLC. The recorded live sessions, the asynchronous chats (Q&A), and the shared Word document were data sources for this study.
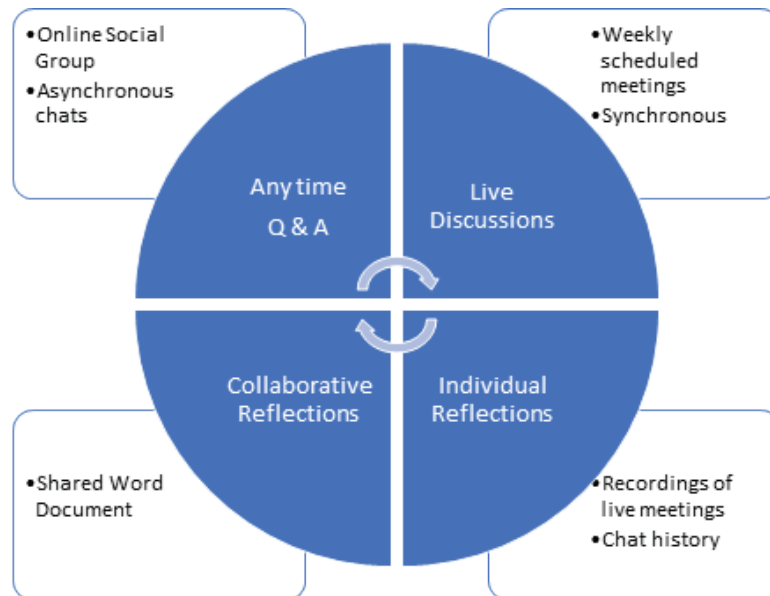
Figure 2. Structure of the SIPLC.

RESULTS

One major theme from the study is the various features of the SIPLC that have contributed to the success of the participants' professional learning. First, the existing close relationship and trust among the participants make everyone feel safe and comfortable asking questions in this community that they might not do in a formal PD. Secondly, the shared professional background (all come from the same college) makes it easier for members to understand each other's challenges and lend support as colleagues and friends. Finally, the different levels of experiences with online teaching among members naturally formed a mentor-apprentice relationship between them. The three members experienced with online teaching served as mentors to the two rookies. The one-on-one mentoring was successful because it matched the exact needs of the mentee (Bayar, 2104). The specific needs of the mentees in this study were in the areas of using online technologies (e.g., Zoom, Blackboard Ultra) and adding asynchronous discussions to online instruction.

Social and emotional support to each other and to the students emerged as an important need for PD as both teacher educators and in-service teachers were experiencing emotional and social ups-and-downs with remote teaching/learning and the stay-at-home order (Venet, 2020). The participants not only used this SIPLC as a platform to support each other socially and emotionally but also sought out ways, such as adding extra time for small talks during the weekly class meetings and sending personalized emails to each student, to ease the social and emotional stress among their students.

IMPLICATIONS

The success of the SIPLC suggests four critical elements for a PLC: 1) mutual trust among members, 2) varying levels of expertise, 3) shared professional background, and 4) just-in-time support. These elements are important considerations when forming future PLCs for teacher educators and pre/in-service teachers.

1. An existing collegial relationship is a great starting point to promote interactions and trust among members. The degree of trust significantly affects the effectiveness of PLCs because trust helps promote cooperative behaviors such as sharing, engaging, and relying on each other (Costa & Anderson, 2011). In many teacher education programs, pre/ in-service teachers are forming relationships with each other or with their teacher mentors through shared learning and internship experiences. To plant the seed for the development of future PLCs, these emerging relationships should be continuously nurtured throughout and beyond the program to help build and sustain trust so that the pre/ in-service teachers could benefit from them during their internships and classroom teaching.

2. For teacher educators, the need for professional learning after the pandemic will continue to grow. A SIPLC with members who have varied levels of expertise is a viable approach for teacher educators to address the various post-pandemic PD needs. The power of informal mentor-protégé relationships (Liang, 2019) is evidenced in the findings of the study where the participants formed into a mentor-apprentice partnership due to varying levels of expertise among them. A SIPLC that builds on an existing relationship and trust offers members the choice for mentors (Gehrke, 1988), supports mutual and collaborative mentoring (Landay, 1998), and provides the opportunity for mentors to challenge mentees with empathy (Smith & Johnson, 2017). These elements are effective strategies to avoid the power structure in the mentor-protégé relationship in PLCs (Awaya, McEwan, Heyler, Linsky, Lum, & Wakukawa, 2003).

3. Shared values, vision, and practices are important characteristics of Hord and Sommers' (2008) framework for PLCs. The results of the study shed light on the pivotal role of shared personal and professional background and practices in professional learning (Li & Tu, 2018; Olivier, Hipp, & Huffman, 2010). The social connections through shared backgrounds become the social capital, a major catalyst in empowering members to develop leadership in the community (Wilson, 2016). To support pre/in-service teachers, PD practices should promote a culture of inclusiveness and shared values to help generate meaningful conversations and reflections among members in a PLC.

4. Just-in-time support through asynchronous and online informal gatherings is an effective strategy to quickly release anxiety and improve motivation for addressing bigger challenges. Just-in-time support is the support on-demand that is provided to people just when they need it (Glazer, Hannafin, & Song, 2005). Instead of systematically tackling the full-scale obstacles created by the pandemic, members of the SIPLC found it beneficial to start with the smaller issues they were facing at the time. The immediate positive changes (e.g., learning to use some basic features of an online tool to deliver instructions) as a result of the just-in-time support offered in the SIPLC created momentum for continuous communication and learning to address greater issues such as effective online pedagogy.

Unlike assigned PLCs, a SIPLC is flexible and members may join or leave anytime. Professionals could belong to multiple SIPLCs for different purposes. As future PLCs form, it is important to note the emerging PD needs in social

and emotional support for educators and pre/in-service teachers because it is a critical factor for successful remote teaching (Venet, 2020).

FUTURE RESEARCH

Self-study is a useful methodology to examine teacher educators' professional learning experiences (Hamilton & Pinnegar, 2013). As pre/in-service teachers or teacher educators engage in PLCs or SIPLCs, they could adopt a self-study approach to help reflect-in-action and reflect-on-action, both of which are integral parts of true adult learning (Schon, 1983). In this study, the participants collaboratively reflected together. For future research, it would be beneficial to include more reflection-on-action activities through chats and live meetings to further improve online teaching practices. Another direction for future research is a longitudinal self-study approach as it may help unveil the evolution of a SIPLC over different issues that may involve different members. Future research in this area may also look to include participants from different colleges or disciplines to offer more insights on the collaborative reflection and learning among members in SIPLCs.

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Global Webinars for English Teachers Worldwide During a Pandemic:
"They came right when I needed them the most"

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As the spread of COVID-19 closed schools worldwide, teachers everywhere have been tasked with teaching their classes online. This chapter focuses on outreach to a specific segment of this population: English language teachers. The use of webinars has proven to be an effective way to reach teachers globally, particularly English teachers who have a common language of communication in addition to a common language of instruction. The webinars described in this chapter were developed for a global audience, offered freely and at multiple times, and implemented quickly to respond immediately to English teachers' needs. In addition, the webinars were followed with additional free resources posted on a blog. Using webinars can be an effective approach for teacher professional development. The professional development approaches shared in this chapter can be easily replicated to support educators who are new to remote or online teaching in local, regional, national, and international contexts.

Keywords: online, global, webinars, teacher professional development, English language teaching, ELT

INTRODUCTION

Efforts to contain the COVID-19 pandemic have required English language teachers worldwide to teach their students online. Because English is the world's lingua franca, education systems worldwide emphasize teaching English as a second or foreign language in both public and private sectors. This created an urgent global need for practical professional development. As university faculty we partnered with National Geographic Learning (NGL) and the Office of English Language Programs (OELP) in the Bureau of Educational and Cultural Affairs at the U.S. Department of State to offer free professional development webinars to teachers globally. NGL, a global publisher of English teaching materials, and OELP, a government program focused on international public diplomacy initiatives, were quick to recognize the need for English teachers to gain new knowledge and skills for teaching remotely. Knowing that the strategies shared in the webinars needed to be quickly understood and applied, we decided to focus on "tips" that could be learned and applied individually or collectively. The tips focused on both the design and facilitation of synchronous and asynchronous online remote instruction. The creation of the tips was guided by:

- frameworks such as Community of Inquiry (Garrison, Anderson, & Archer, 2000) and PICRAT (Kimmons, Graham, & West, 2020),

- the K-12 focused National Standards for Quality Online Teaching and Courses (Quality Matters & Virtual Learning Leadership Alliance, 2019a, b), and

- research studies conducted by us and others on discussion facilitation (Hara, Bonk, & Angeli, 2000; Shin, 2016; Shin & Bickel, 2012), video feedback (Henderson & Phillips, 2015; West, Jay, Armstrong, & Borup, 2017), video content (Guo, Kim, & Rubin, 2014), social presence (Borup, West, Thomas, & Graham, 2014; Lowenthal & Dunlap, 2018; Rourke, Anderson, Garrison, & Archer, 2001), blended learning strategies (Graham, 2006; Graham, Borup, Short, & Archambault, 2019).

INNOVATION

We first partnered with NGL to provide a series of three webinars called "Breaking Through the Screen: A Dozen Tips for Engaging Students in Online English Language Teaching" (see Figure 1).

Figure 1. Breaking Through the Screen Infographic.

These thirteen practical tips (a baker's dozen) were developed and grouped into three one-hour webinars. See Figure 2 for an example of the social media promotion. The tips covered in each webinar are listed below:

Part 1: Engaging Students in Meaningful Learning Activities (Tips #1-6)
Part 2: Making Your Screen Come Alive (Tips #7-9)
Part 3: Building a Supportive Learning Environment (Tips #10-13)
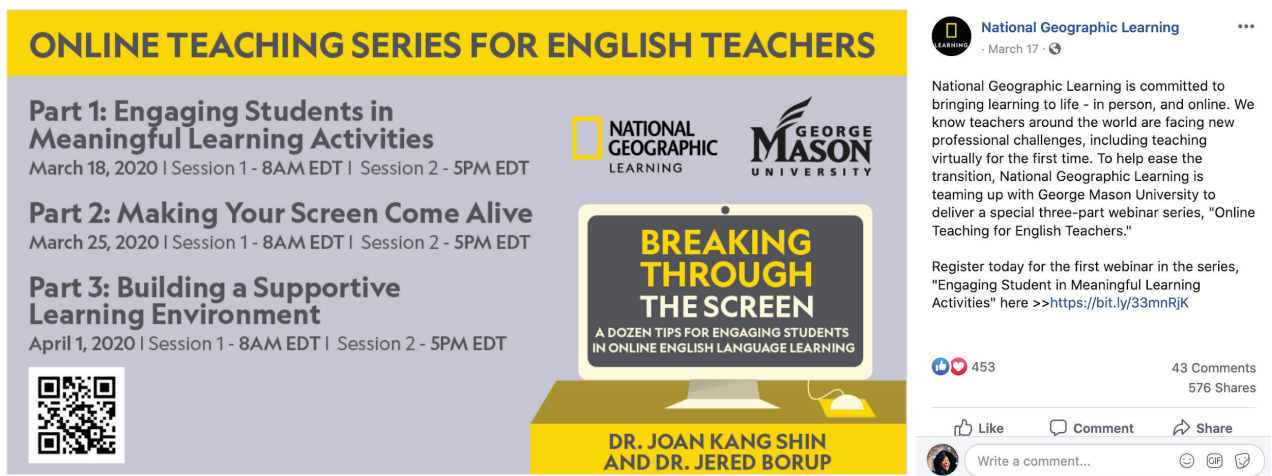
Figure 2. Social media post announcing the webinar series.

This series of three webinars was originally developed for teachers in China. After the success of the first webinar, there were requests to offer it globally. As a result, each webinar was offered three times, once for China and twice globally to accommodate the different time zones. NGL posted recordings of the global webinars on their website and made them freely available. We also wrote blog posts that accompanied each webinar recording. According to NGL the webinars' attendance was the highest they have had to date (see Table 1).

Table 1

Attendance of China Webinar Series and Global Webinar Series

	China Webinar Series		Global Webinar Series	
	Mar 12, Mar 19, and Mar 26		Mar 18, Mar 25, and Apr 1	
	Registered	**Attended**	Registered	**Attended**
Webinar 1	475	**386**	6596	**2854**
Webinar 2	716	**443**	6537	**2630**
Webinar 3	563	**253**	6158	**2593**

Upon completion of the webinars for NGL, the Office of English Language Programs (OELP) in the Bureau of Educational and Cultural Affairs at the U.S. Department of State invited us to provide a one-hour webinar. The webinar was promoted using their American English for Educators Facebook page and provided through Facebook Live (Figures 4 and 5).

Figure 4. American English for Educator Facebook Post.
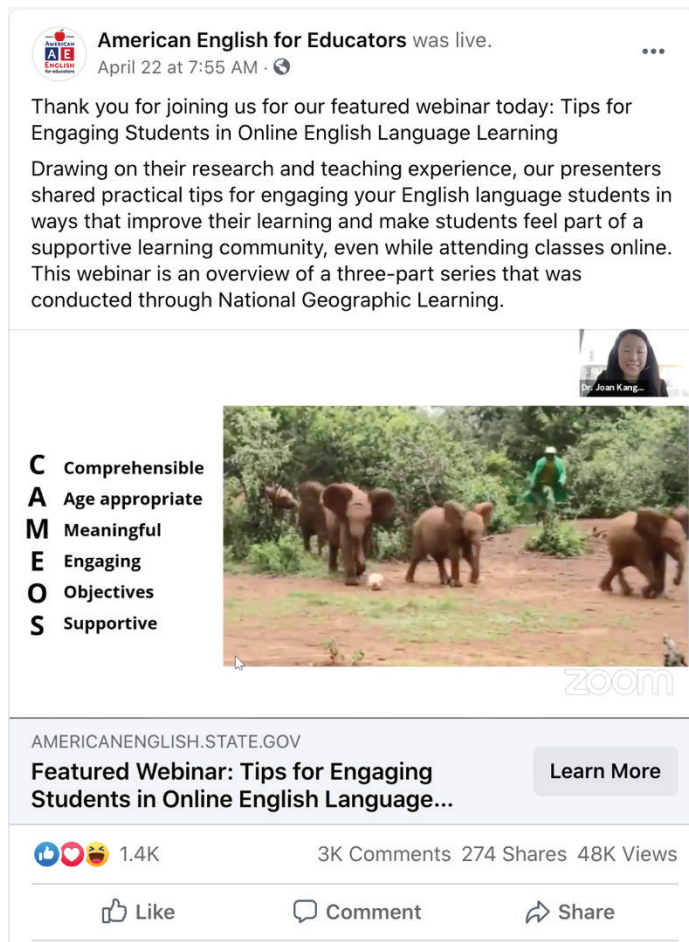
Figure 5. Screenshot showing the morning Facebook Live event.

This OELP webinar was based on the material shared in the NGL webinar but was organized largely using the PIC-RAT framework. The webinar was also offered twice on the same day to accommodate different time zones. Based on the OELP's follow up report, the webinars were record breaking with over 94,000 views, 4,300 comments, 2,500 reactions, and 450 shares. Countries with top viewership were Pakistan, Peru, Mexico, and Nepal.

RESULTS

A post-webinar survey was distributed after the Global Webinar Series by NGL. Based on responses from 880 anonymous participants from 80 countries, 95% agreed or strongly agreed that 1) the webinars addressed the challenges they were facing in their online teaching; and 2) they will change how they teach online as a result of the webinars they attended. Ninety-nine percent responded that they would recommend the webinars to other teachers. Survey participant comments were also largely positive similar to this one: "Thank you for helping us with our professional development. The current global issues changed our lives drastically and these webinars help us fix some of our issues."

One early result speaks to the relevance and applicability of the webinar content globally. From the comments about how respondents' teaching will change as a result of the webinars, many expressed applying the tips in their teaching immediately. A representative comment from the survey is: "I have learned a lot with the webinars, and have already included some strategies in my practice. I believe I am already teaching in a better way than if I hadn't watched them."

While participant comments were largely positive, suggestions for improvement tended to focus on how the provided examples were not applicable in higher education (e.g. "I would prefer more adult topics as my learners are usually adults."), wanting additional technologies (e.g., "Some websites or apps to improve teacher-students and students-stu-

dents' interaction"), or strategies for teaching specific concepts or skills (e.g., "Include some webinars regarding how to teach pronunciation online").

One of the goals for the webinar series was to provide multiple ways to access the professional development content. Those who attended live participated in polls and actively posted text comments throughout. We also provided more flexible learning opportunities by posting webinar recording and blog posts that contained links and additional resources. It was important that all events and resources remain free and open. As one participant expressed in the survey, "I was very appreciative to have these offered -- and at no charge. Thank you for your timeliness, response, and generosity! We are in this together!"

IMPLICATIONS

Webinars can be an immediate and effective way to reach a global audience. The high participation rates of these webinars are a reflection of the high need for professional development that helps teachers to provide their students with remote online teaching. The survey results also showed that the actual webinars were perceived as helpful. While the webinars benefited a wide range of teachers of English, participants' suggestions for improvement indicated that more focused, smaller workshops would also be beneficial.

Conducting a webinar series can be easily replicated to reach teachers locally, regionally, nationally, or internationally. However, before embarking on a similar initiative, it is important to do the following:

1. identify the specific audience;
2. develop content relevant for the audience;
3. schedule webinars times that are as convenient as possible (e.g., multiple times of day for an international audience is best);
4. provide ways for the participants to share their own ideas with each other (e.g., chat box, audience polling); and
5. find multiple ways for the audience to access the information (e.g., webinar recordings, blogs, social media posts and events).

The following table includes direct links to all of the free resources from this collaborative initiative. These can be repurposed or linked to in its current form to provide useful ideas for any teacher looking for ideas for online teaching. In addition, the approach to the webinar implementation, such as content, delivery, promotion, and follow-up materials, can be replicated for new audiences.

Table 2
Webinar Series Products

	Brief Descriptions	Links
Webinar Recordings	NGL posted the recordings on their webinar site (https://webinars.eltngl.com/) and created a specific webpage with the links to the webinar recordings.	Online Teaching Series for English Teachers page: https://bit.ly/NGLwebinars
	U.S. Department of State American English for Educators Facebook Live webinars were recorded and posted.	8:00AM session recording: https://bit.ly/AAEwebinar1 1:00PM session recording: https://bit.ly/AAEwebinar2
Blog Posts	Blogs written for NGL.	Blog #1: https://bit.ly/NGLblog1 Blog #2: https://bit.ly/NGLblog2 Blog #3: https://bit.ly/NGLblog3

FUTURE RESEARCH

This chapter reported an initial analysis of the post-webinar survey results. Further analysis of this survey is planned for a future research article and will not only help us understand the effectiveness of this webinar series in teacher profes-

sional development, but the global reach of this survey will also give us a window into English teachers' online teaching practices and needs around the world. With this new exploration of online tools and approaches due to the COVID-19 crisis, we anticipate that teachers may change their teaching practice towards blended approaches when it comes time to reopen schools and engage with students in physical classrooms. Our survey also examines teachers' perceptions about how their teaching practice has changed and may continue to change based on the challenges of this crisis. Future research should certainly examine how this global health crisis may result in the wider implementation of blended teaching and learning practices around the world.

CONCLUSION

Responding quickly to educator needs was an important feature of this webinar series. As one teacher expressed about the webinars: "Just thank you, because they came right when I needed them the most." Educational needs due to COVID-19 are both global, local, and immediate. The charge for experts in educational technology and teacher education is clear. Webinars, amplified through blog posts and social media, can be an important part of the overall solution that can be far-reaching, immediate, and impactful.

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Modifying Technical Training for the Online Environment:
A Community of Inquiry Approach

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A grant-funded initiative to seed new school maker clubs into a four-county region was to begin in summer 2020 with a three-day, face-to-face, teacher professional development institute on four programmed robotics platforms (Cubelets, Sphero RVR, mBot, and LEGO EV3), followed by maker club implementations in eight middle and high schools during the 2020-21 school year, and two further years thereafter. Due to coronavirus-related closures, we present a plan informed by Community of Inquiry (CoI) theory and research to move this summer training program online and into teachers' homes. The plan involved curated web resources and purposefully selected web tools (Zoom, FlipGrid, Slack) to ensure continuity toward project implementation in the fall, while beginning to build a supportive community between club mentors. This approach has implications for other technical professional development providers in terms of structuring cognitive challenges, facilitating community interactions, providing for trainer feedback, and supporting implementation after training.

INTRODUCTION

We received a three-year grant to seed new maker clubs into 24 middle and high schools, emphasizing programmed robotics for its ties to available technical jobs in this region (i.e., new corporate data centers, robotics-enabled manufacturing). A three-day training event for our first cohort of eight in-service teachers was unexpectedly moved online due to coronavirus-related closures. To design effective online technical training, we developed strategies to account for three "presences" (teaching, cognitive, social) recommended by Community of Inquiry (CoI) theory (Garrison et al., 2000). These presences have been well validated by research (Dempsey & Zhang, 2019), align with professional learning standards (see Table 1), and align with the touted goal of promoting community through makerspaces (Bevan et al., 2017).

Table 1

CoI Presences Aligned to Professional Learning Standards

Community of Inquiry Presences (Garrison et al., 2000)	Professional Learning Standards (Learning Forward, 2019)
teaching presence: content design and organization, direct instruction, facilitation of discourse, assessment	professional learning **leaders** "develop capacity, advocate, and create support systems" (p. 2); coordinate **resources**; align **outcomes** with curriculum standards; learning assessed and programs evaluated by student or system **data**
cognitive presence: construction of meaning through practical inquiry-- triggering events, exploration, integration, resolution	**learning designs** based on "theories, research, and models of human learning" (p. 2)
social presence: affective social projection, open/safe communication, development of group cohesion	**learning communities** "committed to continuous improvement, collective responsibility, and goal alignment" (p. 2); **implementation** informed by research on change

INNOVATION

Our planning team conferenced bi-weekly on Zoom during spring 2020, selecting Google Drive to host training materials as files could be co-edited and shared with participants online. An online agenda (https://tinyurl.com/y8rpy5q4) was developed and pre-loaded with links to all training materials for quick access by participants. CoI theory and research were applied to ensure the training supported teaching, cognitive, and social presence as follows:

Teaching Presence Plan

Teaching presence involves selecting and organizing resources, and planning for any direct instruction, facilitated discourse, or assessment (Dempsey & Zhang, 2019; Garrison et al., 2000). The "quality of teaching presence" correlates with "student satisfaction and learning" (Miller et al., 2014; Shea & Bidjerano, 2009, p. 129), however overly directed instruction can demotivate advanced or exploratory learners (Cole et al., 2017). To begin organizing resources, we first listed the needs for each robotics kit on a shared spreadsheet (pre-training tasks to complete, peripherals to order) along with available resources (lessons, units, worksheets). These specifications were expanded into resource pages to guide mentors during training and later students in clubs (see https://programmedrobotics.weebly.com/the-robotics.html). To enhance teaching presence, Budhai and Williams (2018) recommend instructors "scaffold and differentiate instruction" to support students, guiding us to segment our resource pages for different users: club leaders setting up software and equipment, novices learning kits for the first time (entry-level challenges), more experienced users seeking advanced challenges, and participants seeking to connect with a wider user community (p. 82). Open labs were scheduled for the training to allow participants to explore challenges suitable to their level of expertise, with a host available on Zoom to answer any technical questions.

Cognitive Presence Plan

Cognitive presence reflects "the extent to which participants… are able to construct meaning through sustained communication" and involves inductive "triggering events" for critical inquiry, divergent "exploration" and information sharing, convergent "integration" to connect ideas, and deductive "resolution" to apply ideas (Akyol & Garrison, 2011; Garrison et al., 2000, p. 89). We shared entry- and advanced-level coding challenges on resource pages as "triggering events." Participants will self-explore challenges during open lab blocks, share results on FlipGrid boards, and reply to connect with others' experiences. Following labs, Zoom meetings to discuss robotics integration will help to further synthesize ideas. After training, our Slack community (http://prism-robotics.slack.com/) will support participant efforts to apply robotics with a dedicated channel for each kit. Research has shown channels to be one of the more popular features of

Slack for their ability to support concurrent, structured communication (White, Grierson, & Wodehouse, 2017). Mentors can discuss kits and ask questions in this safe space with threaded replies, share resources via app integrations, and react to or bookmark favorite resources.

Social Presence Plan

Social presence relates to affective communication or projecting one's self and gaining acceptance, open communication for critical discourse in safe spaces, and group cohesion or development of shared goals (Dempsey & Zhang, 2019). Research suggests social presence is a "product" of teaching and cognitive presence, hence the connection between communication tools introduced previously (Armellini, & DeStefani, 2016; Dempsey & Zhang, 2019, p. 73). In support of affective communication, we chose to employ Zoom-based introductions and discussions, and FlipGrid boards for participants to project themselves to peers. Projection can be difficult in online settings dominated by text-based communication (Miller et al., 2014), suggesting an advantage for audio-visual modes such as FlipGrid (Miller et al., 2014). Holbeck and Hartman (2018) recommend FlipGrid for supporting social presence with learners projecting thoughts about teacher-created topics and connecting with peers. Carpenter and Green (2017) suggest social tools with a voice element may better support social presence among teachers in professional learning. While FlipGrid represents a social forum for our project with both mentors and students sharing and discussing completed robotics challenges, Slack represents a private, safe forum where mentors can critically discuss implementations. Community of practice research suggests persons are motivated to share knowledge when sharing has both emotional ("being able to contribute") and intellectual benefits ("developing expertise") which we plan to support through forums with different goals (Ardichvili, 2008, p. 548).

RESULTS

This chapter was submitted prior to our summer training, but tangible results of preparation are linked from our online training agenda at https://tinyurl.com/y8rpy5q4 (i.e., resource pages developed for each robotics platform, pre-readings, synchronous Zoom sessions, Google Slide presentations, community sites, conceptual assessment, and training evaluation). Intangible results of preparation include pre-planning for necessary materials (e.g., batteries/chargers not included in robotics kits, paper required for color-identifying and line-following challenges), and ordering/shipping materials to multiple participants' homes instead of distributing at an event.

IMPLICATIONS

The implications of our modified training approach for other providers of online technical professional development include:
1. The need to preselect and post online the differentiated challenges or "triggering events" that will allow participants with varied skill sets to explore technical concepts with shipped equipment and software, and to provide lab time for this work with technical support (e.g., trainer on Zoom to take questions).
2. The need to provide an online platform for community in which geographically separated participants can still project themselves to peers and possibly to students as a means of demonstrating expertise and developing confidence with technical concepts (e.g., FlipGrid). Since our program trains future mentors, we want to help trainees "develop their own forms of teaching presence" within FlipGrid (Shea et al., 2010, p. 142). We posted the first FlipGrid videos to model our expectations for sharing work on challenges, with teachers posting similar videos during training. This transition ensures mentors have established teaching presence and displayed expertise before students access FlipGrid.
3. The need to ensure remote participants still receive feedback on their work by selecting online platforms for project sharing/documentation and trainer commenting/encouragement. We chose FlipGrid, but other audio-visual tools like Voicethread can be applied to document makerspace projects (Oliver, Moore, & Evans, 2017).

4. The need to support application of learned concepts to practice both during an event when training together virtually (e.g., synchronous Zoom-based discussions about kit integrations) as well as after training in an ongoing manner for participants separated by time and distance (e.g., asynchronous Slack-based sharing and questioning). When separated, apps like Slack and Voxer that can provide users with notifications for new messages may better prompt them to respond to any questions. Prior research has shown online discussions and instant messaging similar to conversation threads in Slack can support cognitive and social presence among teachers in both formal professional development (Nami et al., 2018) and informal professional learning (Carpenter & Green, 2017).

FUTURE RESEARCH

This project informs four areas of future research with considerable existing instrumentation available to support replication and confirmation by other researchers. First, how effectively does a CoI form across maker club mentors? We will transcribe FlipGrid videos/replies and extract Slack posts to code for evidence of community formation. We opted to administer Arbaugh et al.'s (2008) comprehensive CoI instrument, instead of instruments for measuring individual presences (see Cakmak et al., 2014; Kim, 2011; Miller et al., 2014).

Second, how effectively do club activities support coding and robotics understanding and interests? We will administer a pre-post assessment to teachers and students, combining four instruments: the Computer Science Concepts Inventory (Rachmatullah et al., 2019); the Computing Attitudes Survey (Dorn & Tew, 2015); an original instrument that asks participants to identify robotics parts and define their functionality; and a robotics interest questionnaire from Nebraska 4-H (Barker & Meier, 2006).

Third, how effectively do new maker clubs evolve toward the ideal "tinkering dimensions" described by Bevan et al. (2017)? We will apply an observation protocol for site visits and a focus group protocol for mentors to describe which dimensions emerge and under what conditions. Original instruments will be shared in the Slack community (admin channel).

Finally, research evidence suggests computational thinking can emerge from programming robotics (Witherspoon et al., 2017). When students are prompted to discuss their programmed robots in FlipGrid video, these artifacts can be coded for evidence of computational thinking processes (e.g., decomposition, abstraction). We have previously published promising evidence of computational thinking through making, as reflected in students' written and FlipGrid-recorded project documentation (Houchins & Oliver, 2019; Houchins, Tatar, & Oliver, 2020; Oliver & Houchins, 2019; Oliver & Houchins, 2018).

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Coping During Covid-19
Building a Community of Practice (CoP) for Technology Integration and Educational Reform in a Time of Crisis

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This paper describes an intervention to support educators facing the unprecedented challenge posed by COVID-19 building closures. Our efforts focused on pedagogies, practices and learning technologies for supporting K-12 educators as they transitioned to remote learning. As we sought solutions, it became clear at the onset that our interconnectedness offers tremendous power for addressing this crisis, leading us to develop a Community of Practice (CoP) for mobilizing collective action to develop solutions for shared challenges and promote professional learning. Recommendations as well as insights for future research are provided.

INTRODUCTION

The advent of COVID-19 magnified the already proven importance of teachers' professional development for technology integration (Liao, Ottenbreit-Leftwich, Karlin, Glazewski, & Brush, 2017; Parsons, Hutchison, Hall, Parsons, Ives, & Leggett, 2019; Philipsen, Tondeur, Roblin, Vanslambrouck, & Zhu, 2019). As a well-established research and professional development hub, we used social media to reach out to our K-12 partners to develop an "emergency" Community of Practice (CoP) - a group sharing a common domain, practices, and social connections - focused on remote learning. Our CoP encompassed a Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 1999), which highlights the importance of interaction and sustained brainstorming for developing a cohesive and proactive learning community able to adapt to new events and challenges, as those presented by COVID. Such frameworks have proven effective for facilitating remote teachers' professional development (e.g., DeBay & Bourdeaux, 2019; Johnson, Dunlap, Verma, McClintock, Marques, Loureiro & Marques, 2016; Tseng & Kuo, 2014), building on previous evidence of how informal learning communities can benefit teachers' self-reflections and adoption of new technologies (Caldwell & Cox, 2018; Instefjord & Munthe, 2017; Marcia & Garcia, 2016).

INNOVATION

We convened a Google Meet with a core group (CoP core) of our K-12 partners for input regarding teacher needs, resulting in a CoP offering structured and unstructured opportunities targeting two goals.

Goal 1: Exploring Educational Technologies and Solutions

Discussions with our CoP core revealed teachers were seeking guidance on remote teaching strategies as well as insights and training on accessible tools that were not content-specific, but offered affordances to create remote learning experiences to keep students interested and active as they worked toward curricular goals. This led us to organize daily Google Meets identified by specific hashtags (e.g., #remotelearning) based on specific tools/ strategy addressed. We focused on topics (e.g., assessment), strategies (e.g., choice boards) while targeting accessible tools vetted in our own

classroom research and recommended in curated lists from ed tech organizations (e.g. EdSurge, ISTE). The CoP core served as resource experts to lead discussions with member/s of our center moderating to facilitate discussions. A Padlet wall was created and embedded on our center's website for posting topics/questions for future Meets.

The Meets informed video tutorials created by our team and CoP core. Following the literature (Guo, Kim & Rubin, 2014), tutorials were organized into series targeting just one tool at a time (e.g., Google Forms) with each series encompassing 6-7 "how-to" modeling clips (2-3 minutes each) addressing specific features of the tool and its application for teaching and learning.

Goal 2: Personalized Professional Development

CoP synchronous activities were promoted via our center's Facebook page and Twitter posts and through weekly emails to our K-12 partnership database, with representation from classroom teachers, technology integration specialists, and administrators. Asynchronous engagement was possible through our CoP website (http://www.rcetksu.org/) and social media profiles, offering:

- Daily updates from state/national ed tech entities (e.g., Digital Promise, ISTE)
- Curated resources posted daily by our team
- Video tutorials
- A portal for submitting support requests

Resources and activities were planned in weekly meetings involving different members of our research center with our CoP core. Figures 1 to 3 provide examples.

Figure 1. A screenshot from the tech talk about Book Creator (https://www.youtube.com/watch?v=pyCfWD0i0jU&feature=youtu.be&fbclid=IwAR1xK3Ice9EK-EUg_ul0dw8NJkjRP_TitQIYYfubkjjW5jZTkA27Z8u-Sdw).
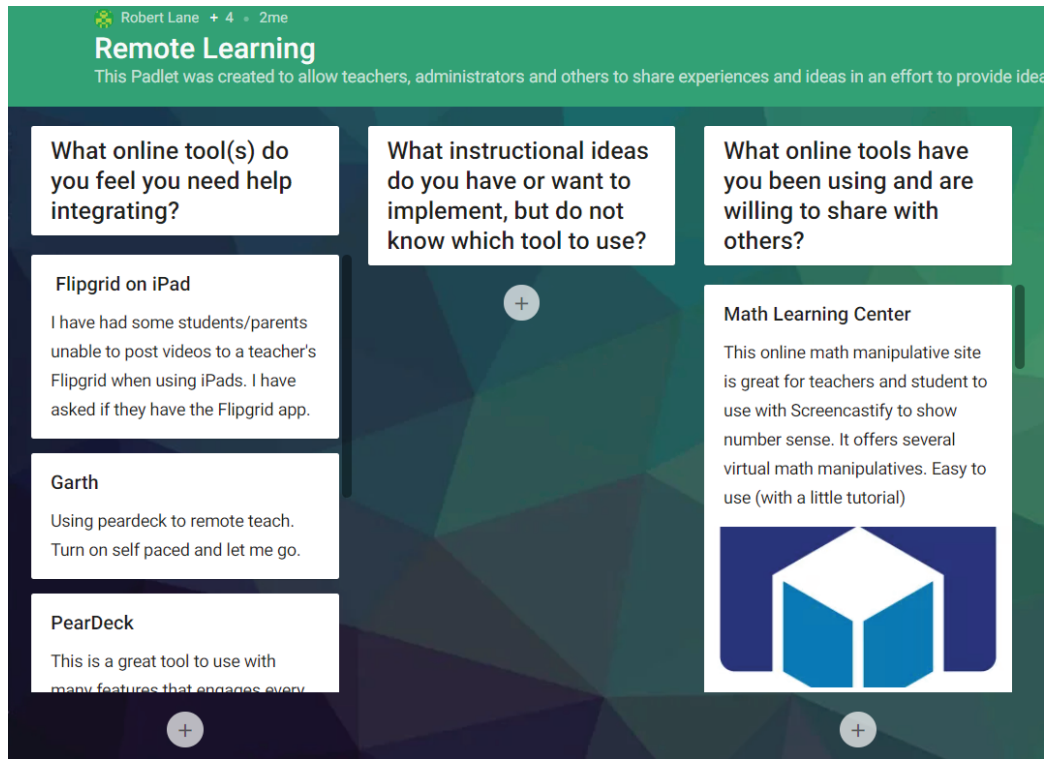
Figure 2. The Padlet created for gathering ideas and feedback (https://padlet.com/sp_lane/byqqx06nomsi).

Figure 3. The google sites tutorial series (https://spark.adobe.com/page/G4GdLYHlbwPJb/).

RESULTS

The alternative of synchronous events and open source content has been found to be promising for addressing a wide array of professional needs and challenges. After the first week, the tech talks became longer (around 50 minutes) and more popular (average of 18 participants) and structured, starting with the tool demonstration/topic description and then moving from concrete issues (e.g., grading) to wider and cross-curricula reflections along with extended question and answer sessions. Feedback from CoP members documented participants' value and transfer of the experience - e.g., "I think this [Book Creator] will be a great resource to help me continue my writing instruction for my students!" (First grade teacher). The emphasis on shared concrete issues for fostering broader and more proactive reflections worked: participants' focus shifted from short-term tasks to deploy remote learning towards longer-term solutions for effective blended learning.

IMPLICATIONS

The most significant lesson we learned is the power of collective action. The convening of teachers and administrators to collectively identify common challenges and build solutions has the potential to create an actionable framework for sustainable change. Over the course of the CoP, discussions evolved from an initial focus on instructional delivery to consideration of proven, pedagogical approaches and strategies CoP members had implemented in their own classrooms that could be leveraged in the short-term for remote instruction and ultimately to blended learning settings. Further, the evolution of the CoP expanded our own understanding of educators' professional learning needs and the types of activities and resources they valued. We also realized that a broad lens did not support all educators, pointing to the additional need for more focused opportunities specific to grade bands and subject areas. In addition, our CoP attracted educators and schools already interested in learning technologies, which made our audience receptive but also suggested that to have a broader impact, more efforts are necessary for engaging educators with limited experience and/or interest with regard to technology.

There are four main implications related to our CoP that we recommend as leading strategies. First, accessible technologies and social media (especially Twitter and Google Meets) quickly enable educators to come together around a common need, providing a context to share tools, discuss challenges, and socialize. Second, the combination of synchronous events and a repository of free instructional materials (from Padlet to PearDeck) should be considered in both face to face and remote professional development due to flexibility and accessibility. Third, the ability to listen to your CoP members through the aforementioned platforms is fundamental for informing your training efforts long term, addressing what is relevant but also restructuring your content for serving specific teaching audiences. Fourth, targeting your surrounding community with local technology experts and coordinators (keep referring to social media like Twitter and Facebook) is an effective strategy for harnessing common ground (e.g., similar policies in grade bands and school settings) and a pragmatic scope, leading to interaction and mutual understanding.

FUTURE RESEARCH

From these promising highlights, additional studies need to be directed for evaluating and refining our efforts properly, and more focused investigations (e.g., via surveys and follow-up interviews) are required to understand how this new knowledge impacted teaching practices in the long term and should be reshaped with different learning audiences (e.g., pre-service teachers, professional coaches, instructional designers). Finally, further investigations should explore how emergence CoPs with different teaching audiences (e.g., teachers not interested in technology or dealing with digital divide) or operating in different contexts (e.g., different states and countries) should be organized and managed, also considering the dynamism of the current situation.

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Fostering Interaction in Synchronous Online Class Sessions with Foreign Language Learners

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Due to the rapid spread of COVID-19, experienced in-person foreign language tutors had to shift to fully online foreign language instruction and thus needed to develop new skills in terms of technology and pedagogy. Many tutors new to online language teaching found the plethora of learning technologies available overwhelming. Helping tutors select appropriate technologies and sharing best practices can facilitate effective teaching, particularly when tutors are under extra pressure due to a global crisis. In synchronous online class sessions with foreign language learners, tutors need to facilitate communication and online socialization to create opportunities for second language learning. We report on how one instructor created a learning space to facilitate collaboration, interactivity, and social cohesion for beginner learners of German. We provide both guidance and recommendations for teacher trainers on how to support pre- and in-service tutors during the pandemic to facilitate interactive live sessions for language learners based on sound pedagogical **principles.**

INTRODUCTION

The switch to teaching German as a foreign language online at Heilbronn University due to the corona pandemic required swift curriculum adaptation and the development of suitable online materials. From a second language acquisition perspective, foreign language learning requires comprehensible input (Krashen, 1985), interaction to negotiate for meaning (Gass, 2018), and the production of comprehensible output (Swain, 1985). Authentic and meaningful interaction as well as pedagogical support are necessary (Hampel & Stickler, 2005) for the development of communicative online foreign language classes. Successful online language classes require tutors with skills to facilitate communication and online socialization which corresponds to level 2 of Stickler and Hampel's (2015) skills pyramid framework for online language tutor training. When the COVID-19 outbreak happened, the German tutors at Heilbronn University, except for the authors, operated at level 0 and 1 of the skills pyramid, which correspond to gaining basic and additional technological skills respectively. Therefore, rapidly designing quality online teaching concepts and activities with focus on interaction and collaboration was necessary to support tutors new to online language teaching and to facilitate their development to level 2.

INNOVATION

To support the development of communicative skills, the tutor adapted traditional teaching materials for online sessions and made use of LearningApps, a multimodal authoring tool with which educators can create and adapt interactive bite-size modules (see Hielscher, 2012). The modules can be easily shared with students for out-of-class learning. The tutor also used Kahoot!, a competitive game-based application, which has demonstrated a positive effect on language learning in K-12 and higher education (Wang & Tahir, 2020). The tutor's criteria for choosing LearningApps and Kahoot! included their free availability, their usability, and functionality. These are important criteria for tutors who are less technically savvy and under time pressure, especially in COVID-19 times. The online live class sessions on Zoom lasted

for forty-five minutes and took place four days a week with seven international exchange students at beginner level. The students often worked independently in Zoom breakout rooms, which allow for pedagogically-sound language learning environments: students can be paired or put in small groups to facilitate interaction.

Based on the communicative language teaching approach, several tasks and activities were employed. They included information gap activities to practice question words/interrogative pronouns, which encouraged students to reuse previously taught structures and lexis. Another task was the battle ships game, which required the students to ask questions within a competitive setting. A less controlled task was speed dating supporting conversational practice: Students asked and answered questions in pairs, and after five minutes, changed breakout rooms to talk to a different partner. A more traditional task type, peer dictation, created opportunities for negotiation, pronunciation, as well as spelling practice (see column 1–3 on the Padlet wall: https://padlet.com/alicegruber/amxi9554707sha5e).

Some activities required screen sharing while groups consisting of two or three students completed different worksheets in their breakout room. The tutor regularly monitored the students' work in the different breakout rooms and provided feedback on their progress. The students sent their completed worksheets to the tutor via the file sending option in the chatbox. The tutor then distributed the students' answers to all learners through the file sharing option, as well as blank copies of the worksheets for independent study.

To enhance the interactivity of the sessions, multimodal LearningApps modules were used; for instance matching pictures and words and songs for listening comprehension (see column 2 on the Padlet wall). Kahoot! activities included true/false tasks with the aim of getting students to revisit vocabulary and structures in context. All the activities served as formative assessment for the tutor. The tutor aligned the online material with the online textbook used, for instance, by matching the color coding in Kahoot! with colors used in the electronic textbook when working with German noun gender. Multimodal features, such as color coding, make grammatical gender more salient and can facilitate the retention of gender (Arzt & Kost, 2016).

RESULTS

The tutor's session concepts and materials based on second language learning principles facilitated authentic interaction. The tutor also considered her learners' needs, including corona-related stress. Creating new activities often included trial and error. The tutor successfully adapted well-designed materials from the physical classroom to an online environment. The combination of whole group work in the main room and pair or group work in the breakout rooms made the sessions intense and varied. Breakout rooms were an important feature for the tutor's online teaching because of the pair and small group interaction, which is essential in foreign language learning (Gass, 2018), and the increase in individual learners' speaking time. The use of web cameras in the main room and the breakout rooms was valuable in that it facilitates lip-reading, which is particularly helpful in foreign language learning (Davis & Kim, 2001). Web cameras also have socio-affective benefits and can help create a social environment, which is necessary for language learning (Wang, 2004). The students' written anonymous feedback showed that they liked interacting with their classmates in the breakout rooms and experienced it as a safe space.

With regard to the activities designed with LearningApps and Kahoot!, students reported enhanced engagement and motivation, which is in line with Wang and Tahir's (2020) literature review of Kahoot!. LearningApps and Kahoot! provide valuable formative assessment data, which is particularly important in this new reality brought about by the COVID-19 crisis (Liberman, Levin, & Luna-Bazaldua, 2020). Anonymous written feedback from the students revealed that they appreciated the variety of activities and acknowledged them as supporting their language learning.

IMPLICATIONS

Pre-service teacher educator and educators carrying out professional development are encouraged to try or adapt the materials provided on the Padlet wall and share them with their teachers to gain experience in using the online applications. Teacher educators could ask pre- and in-service teachers to design their own activities with the proposed online applications. Ideally, teachers use a framework specifically developed for online language resources, such as Reinders and Pegrum's (2017) evaluation and development framework for mobile-assisted language learning resources.

The COVID-19 crisis has put different kinds of pressure on instructors. Sharing newly created LearningApps and Kahoot! activities and pedagogically-sound online live class session plans with other teachers working with the same

curriculum can, for instance, ease the workload. LearningApps modules from the teaching community can easily and quickly be adapted to every pre- and in-service teacher's needs.

Ideally, pre- and in-service tutors would integrate their learning activities from the suggestions in this report by conducting action research in their specific context. The results could then be shared with fellow tutors. Pre-service teachers could, guided by the teacher educator, present their activities during a live online session with other teachers. Discussing their activities would foster a community of practice, lead to feedback from colleagues, and support teachers in gaining experience both as participants and as hosts in online sessions.

The hands-on implementation of the activities in online sessions with colleagues can trigger discussions on different issues relevant to online foreign language teaching, such as length and timing of the activities. Another possible topic is the possible effects of different components in online live class sessions on the learners. For instance, the annotation function allows anonymous student answers, whereas in the chatbox, answers are not anonymous. The potential impact on some students' anxiety level when they first attempt a non-anonymous writing task in the foreign language could be a point of discussion. Such discussions may also raise pre- and in-service teachers' awareness of affordances and challenges of different components they employ in their online teaching.

Teacher trainers may also want to raise awareness about the possible positive impact and challenges of using web cameras in online language teaching, for instance in breakout rooms. Apart from practical advantages such as facilitating non-verbal cues (Davis & Kim, 2001), they can enhance learners' motivation (Marcelli, Gaveau, & Tokiwa, 2005). However, possible drawbacks such as personal discomfort (Burger, 2013) also need to be discussed with teachers. Teacher trainers might want to talk with novice and experienced foreign language tutors about how to use web cameras pedagogically and gain help to develop web-cam specific skills (Codreanu & Celik, 2013; Develotte, Guichon, & Vincent, 2010; Kozar, 2016).

FUTURE RESEARCH

Our next step is to implement other available activities in the breakout room, such as interactive online board games (see column 1 on the Padlet wall). Following Stickler et al.'s (2020) workshop model, we are offering two online workshops with a group of in-service teachers in May and June 2020. In the first workshop, we present our ideas for interactive online teaching, and in the second session, we aim to get feedback from the workshop attendees regarding their own implementation of some of the activities discussed in the first workshop. Our recommendations for teacher trainers is to experiment with different features of the applications and the videoconferencing tool and to make full use of their affordances, such as their multimodality. Teacher trainers should also share findings from the second language acquisition literature and research on computer-assisted language learning, such as the advantage of color coding or findings regarding the use of web cameras. Sharing hands-on materials suggested in this report, research findings, and hands-on workshops will inform both the future design of teacher courses and the development of pedagogical materials and will support and guide the teachers in their online teaching during the COVID-19 crisis.

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Connecting Learners Through Technology in COVID-19: Facilitating Pre-Service Teacher Collaboration During the Pandemic

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When the COVID-19 global health crisis disrupted a University semester in-progress, instructors for the technology integration courses at a large, public university faced multiple challenges in maintaining instructional continuity and community. Specifically, we explored instructional strategies and technologies that would foster online learner engagement and connection during this time. We redesigned course activities for the online format and utilized mobile instant messaging, digital whiteboard, and synchronous session technologies in conjunction with the learning management system functionality. Early results based on instructor reflections and student feedback offer insights into how the collaborative strategies and tools have fostered meaningful social connectedness for students and instructors during the pandemic. Suggestions for collaborative technology applications to support online teaching are provided.

INTRODUCTION
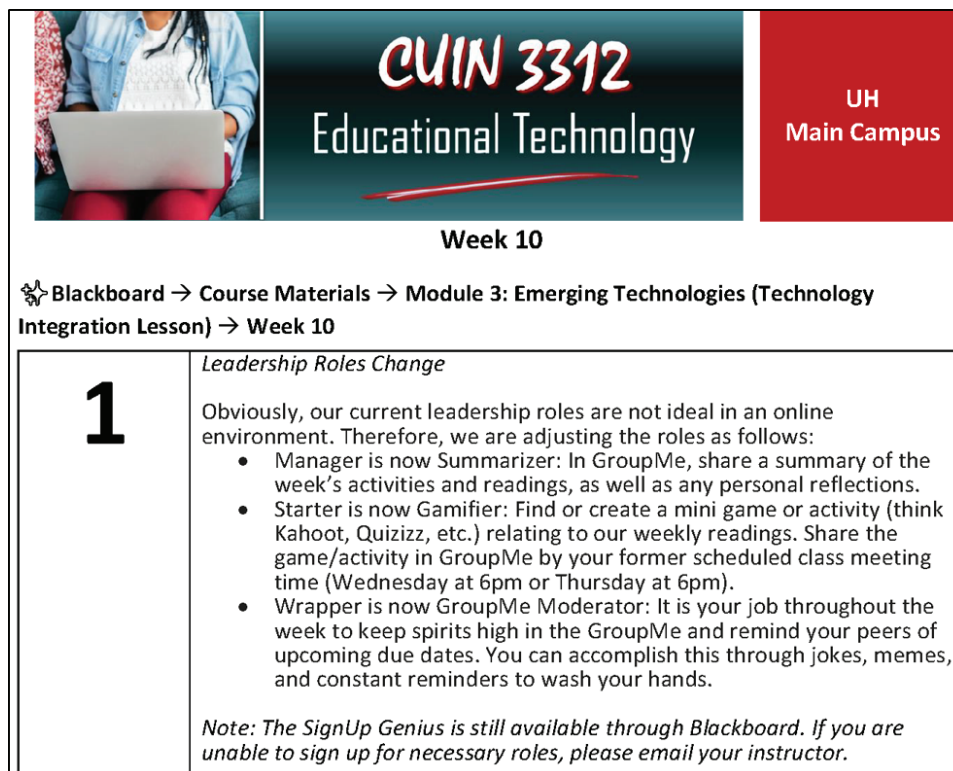
When the spread of COVID-19 prompted campus closure midway through the Spring 2020 semester, we sought online instructional strategies and tools that would enable continued learning in our technology integration courses for pre-service teachers during the pandemic. Serving 165 undergraduates majoring in elementary, middle, and secondary education at a large, public university in the South Central region of the United States, the courses aim to equip future teachers to meet the requirements of national and state competencies in a) using technology to support student achievement and

b) participating responsibly as educators in the digital world. The course sections are taught by four contingent faculty (graduate student and adjunct instructors) and coordinated by a full-time faculty member.

Redesigning course activities to facilitate communication and community-building became a key focus, as we perceived collaboration to be the "social glue" (Harasim, 2000, p. 53) in our courses. Despite challenges of physical separation in the online format (Kebritchi et al., 2017), we prioritized planning for ways our pre-service teachers could collaborate and use various professional communication tools to build relationships and continue class community online, as these skills are essential to meeting professional technology integration expectations (ISTE, 2017; Riegel, 2019). We also recognized that such approaches and tools could support timely and responsive feedback, which is often viewed by students to be essential to connectedness and engagement in online learning (Martin et al., 2018).

INNOVATION

While collectively working toward common goals, we explored how to connect learners both synchronously and asynchronously, and we sought transparent technologies (familiar and user-friendly) for this purpose (Cox & Graham, 2009). We ultimately selected mobile instant message (GroupMe, https://groupme.com/), digital whiteboard (Padlet, https://padlet.com/), and synchronous session (Zoom, https://zoom.us/) technologies to use in conjunction with the learning management system (LMS) functionality, as these tools support varied and flexible means of learner engagement and expression (Gronseth & Hebert, 2019; Gronseth & Zhang, 2018). To illustrate, we re-examined the student leadership roles that were integral to the original structure of one of the courses. The roles facilitated student involvement in the opening, closing, and management of face-to-face sessions. When instruction moved to online, we re-imagined the roles to become "Moderator" (reminds classmates of upcoming due dates and tries to keep spirits high), "Gamifier" (creates and shares short, meaningful games and activities to review course materials), and "Summarizer" (shares information from weekly readings) (see Figure 1). Students completed these new roles within the already established GroupMe class chat.

Figure 1. Excerpt from a course handout with online course leadership roles instructions.

In another course activity, we organized a virtual "Marshmallow Challenge" (see Figure 2) in which students constructed towers using spaghetti, tape, and string to support the weight of a marshmallow. We provided an alternative option to explore applications of similar team-building activities in the distance education format. The courses also utilized the originally scheduled face-to-face class timings to host synchronous sessions via Zoom to facilitate student check-ins, as-needed office hours, and structured discussions in which students could reflect, share, and discuss some of their products they had been creating remotely in the class assignments.

The Marshmallow Challenge

Are you bored by staying at home? Let's have some fun (virtually) together to build marshmallow towers. You can choose Choice A, Choice B, or both for this week's activity.

Choice A:

Watch the first minute of the TED talk: Build a tower, build a team | Tom Wujec (https://youtu.be/H0_yKBitO8M).

Then, spend 18 minutes to build a marshmallow tower by using 20 pieces of spaghetti, 1 yard of tape, 1 yard of string, and 1 marshmallow. The marshmallow needs to go on top, and the structure should be freestanding for you to measure at the end of 18 minutes. After you have done the challenge, take a picture of your marshmallow tower and finish watching the TED Talk.

Share the picture of your marshmallow tower and relevant thoughts to GroupMe. Consider the following questions:

- What are the phases of team collaboration that we experienced in the Marshmallow Challenge?

- What are the attributes of teams that were most successful in the challenge?

- Bonus question: In regards to middle school student collaboration, what insights from the challenge relate to the **co-use aspect** of the Triple E framework for technology integration?

Choice B:

If you don't have the spaghetti and marshmallow available, watch the TED talk: Build a tower, build a team | Tom Wujec (https://youtu.be/H0_yKBitO8M)

Then, search online for ideas of how teachers might apply a Marshmallow Challenge-type activity design in their classroom teaching. Share your reflections about the Marshmallow Challenge on GroupMe. Consider the following questions:

- What other variations of the Marshmallow Challenge could be conducted in the online format?

- What are other similar team-building activities that could be use when teaching at a distance? Find and describe at least one.

Figure 2. Virtual "Marshmallow Challenge" instructions.

The adapted leadership roles prompted students to share resources, encouragement, and humorous memes via GroupMe to help each other cope during the crisis (see Figure 3). The GroupMe groups also provided additional means of communication. One instructor reflected on how this tool helped during the transition online:

> It helps me to create a safe learning environment. For example, one of my students was overwhelmed by everything changed during the pandemic so he didn't log in to the online learning system for weeks, nor reply to my emails. However, when I private messaged him in GroupMe, he responded immediately.
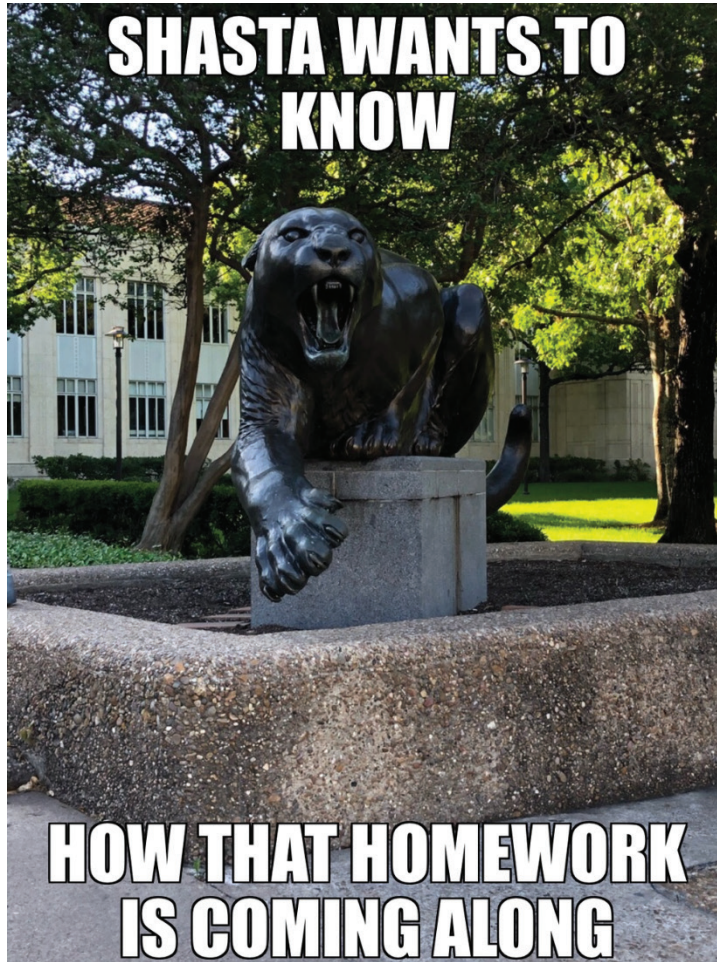
Figure 3. Student-created "Shasta" (school mascot) meme shared in class GroupMe. Image credit: Andrew Lofft.

Another instructor remarked how the GroupMe instant message format made it possible for students to ask questions and receive help from others informally and flexibly. Students used the app to share screenshots and screencasts of their difficulties with course assignments and offer help to others. Students shared pictures of their "Marshmallow Challenge" towers and reflections on the co-use aspect of Kolb's (2017) Triple E framework for technology integration. They posted survey links to practice gathering and analyzing data and shared work products in GroupMe and via Padlet boards. Students seemed ready to respond and help their classmates in these activities. As one instructor reflected:

> Having students share some of their work on Padlet I felt would help mitigate some of the loneliness that came with online learning and promote a sense of togetherness. In addition, students could also double-check the accuracy of their assignments by viewing the work of others. For instance, one student reached out to me after realizing her work was quite different from those of her peers.

During the Zoom session open office hours, instructors answered questions and demonstrated technical skills. Active learning and reflective strategies in the synchronous class meet-ups seemed to amplify student voice and foster participation. For example, a "Rose, Thorn, and Bud" discussion activity highlighted positives/successes (rose), challenges/areas to improve (thorn), and new ideas to explore (bud). After the session, a student remarked that it was "one of the best Zoom meetings I've had ever since all of my classes moved to an online setting" (personal communication, 2020).

IMPLICATIONS

During earthquakes, hurricanes, pandemics, and other disruptive events that contribute to campus closures, it becomes necessary to continue instruction via remote instructional methods (Baytiyeh, 2018). Efforts to promote connection and collaboration in the modified distance education format can involve re-imagining instructional activities and adopting additional technologies. Promoting an online learning community requires an environment wherein learners can actively and collaboratively engage in exploration, knowledge construction, and confirmation of understanding; this is also referred to as a "Community of Inquiry" (COI; Garrison, 2009). There are three elements that are crucial to the building and sustaining of an online COI – *social presence, cognitive presence,* and *teaching presence*.

Social presence occurs as learners identify with the group, engage in meaningful conversations, and develop interpersonal relationships through the projection of their individual personalities. Social presence is key to academic achievement and learner satisfaction (Shea et al., 2001; Zhan & Mei, 2013). Collaborative activities and technologies can be used to encourage students to express their thinking and engage in course-related interactions that develop trust.

Cognitive presence refers to the construction of meaning and confirmation of understanding through problem-based activities. This involves identification of a problem, exploration of a problem through research, knowledge construction through critical reflection, and testing of solutions. Cognitive presence contributes to student interest in course content (Alman, Frey, & Tomer, 2012) and can be promoted through structured group activities (such as the Marshmallow Challenge) that have clear goals, instructions, and expectations.

Teaching presence is supported through an online environment that is perceived by students as both welcoming and collaborative. Instructors facilitate meaningful learning activities and provide timely instruction and feedback in a variety of ways, such as through leading mini-lessons, correcting misconceptions, posting updates, and synthesizing discussions. In the examples offered in this chapter, instructor coordination and planning was essential, involving managerial, social, pedagogical, and technical facilitation aspects (Berge, 1995).

We found that connective tools, including GroupMe, Padlet, and Zoom, were instrumental in maintaining social closeness despite social distancing. The use of these transparent technologies helped to provide consistency and prevent frustration for students in a semester interrupted by the global health crisis. Considering the differing aspects involved in teaching online, we offer an expanded list of tools and example activities (see Table 1).

Table 1
Collaborative Technology Applications to Support Online Teaching

Aspects	Tools	Examples
Social	1. Video creation • Adobe Spark • WeVideo • PowToon	• Introductions • Announcements • Course orientation • Student feedback • Demonstrations • Vlogs • Digital storytelling
	2. Multimedia sharing • Padlet • Lino • Stormboard	• Discussion board • Group project collaboration • Peer review of assignment • Formative assessment/Conclusion
	3. Social media • Twitter • Facebook • HootSuite	• Contact course members in multiple ways • Resource sharing • #Course Twitter chat (real-time or slow) • Book studies • Connecting with experts and organizations

Aspects	Tools	Examples
Managerial	4. Mobile instant message • GroupMe • Microsoft Teams / Yammer • WhatsApp	• Timely responses to questions/ assignments/ projects • Course reminders • Class managers to connect with absent classmates • Team collaboration • Share images of ideas/drafts
	5. Productivity • Office 365 • Google Suite • SignUpGenius	• Sign-ups • Collaborative writing • Sharing learning products • Surveys • Group presentations • Collaborative notes
Pedagogical	6. Retrieval practice • Quizlet • Kahoot • Quizizz	• Key vocabulary • Warm-up • Review games • Pre-scripted feedback • Student-created questions
	7. Video-based discussion • Flipgrid • VoiceThread • Facebook Live	• Introductions • Reflections • Case-study responses • Demonstrations • Exit tickets • "Fliphunt"
Technical	8. Synchronous • Zoom • Blackboard Collaborate • Skype for Business • Microsoft Teams	• Guest speakers • Student presentations • Real-time challenges • Polling • Breakout small group discussion • Team meetings
	9. Interactive image • Thinglink • Piktochart • Glogster	• Interactive syllabus • Photo-based quizzes • Interactive resumes/portfolios • Collaborative data maps • Visualization of concept/ topic
	10. Graphic editing • Canva • Pixlr • Imgflip (Meme generator)	• Course/Syllabus banner • Course promotion infographics • Visual resumes • Charts/graphs • Memes

Choosing from the numerous technology tools for continuing instruction during a disruptive event can be challenging, given differing and changing dynamics of the context. From this experience, we would recommend consideration for the ease of access and use of a potential tool. We found Padlet, GroupMe, and Zoom to be intuitive and involve minimal learning curves to use. They also support varied means of access through smartphone and tablet apps (including Android and iOS) and Web browser on different types of computers. Along with tool selection, we also recommend establishing expectations for the frequency and purposes for communication and interactivity, building in intentional opportunities for students to connect and contribute to the learning community.

FUTURE RESEARCH

The findings reported in this chapter offer insight into how instructors made course adaptations and utilized supportive technologies to facilitate collaborative learning during the COVID-19 pandemic. Data included reflective review of the course curricula, materials, and instructor responses, and the conclusions are limited in scope. Further inquiry into the

student perceptions, engagement, and achievement in the courses could offer greater breadth and depth of the effectiveness of the innovations used in this time of emergency remote teaching. Future research could involve analysis of course artifacts, including student assignments, chat logs, and post-course reflections and evaluations to understand how the instructional approaches and technology tools met student learning needs during the pandemic.

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Whoopensocker Fights the Zombie Apocalypse:
Supporting Teachers with Digital Arts-Based Curriculum

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In this brief essay, we share how we've taken our artist-in-residence program, *Whoopensocker*, online so that educators can continue to use arts practices with their students for self-expression, creativity, and identity exploration. We are also taking this opportunity to ask research questions about how teachers, artists, and students engage in academic literacy practices differently in the online teaching and learning world. We find that a distributed instructional model best captures how we have remade artist-in-residence work in a remote learning world and we expand upon how these principles allow for collaborative emergence among classroom teachers, artist-educators, and students. We argue that these practices are more important than ever, and that teachers, artists, students, and families have their teaching and learning lives enriched through participation in the arts.

Keywords: creativity, arts, distributed instruction, collaboration, elementary school, asynchronous learning, teaching artists, digital art

INTRODUCTION

The arts matter for our humanity. We become who we are through the art that we make, and we come to understand others through their artistic expressions. We are currently living in a time where we are unable to share face-to-face human experience; art-making is more important than ever. Dance and theatre have been eliminated almost entirely from the public elementary school curriculum (Bowen & Kisida, 2017) setting up an unmanageable "arts opportunity gap" that is impossible to bridge without external assistance (Walker, 2012). It is no wonder that classroom teachers struggle to incorporate the arts into their practice. **We choose to see this crisis as an opportunity for arts practices to enrich the lives of teachers and students who are experiencing social isolation**.

INNOVATION

Whoopensocker[1] is a creative arts residency program working in elementary schools, libraries, and community centers across south central Wisconsin with students ages 7-10. The program supports creative expression through writing, performance, and improvisation activities where students learn the power of their own voices, improve their writing skills, and develop positive identities. This is accomplished through a seven week artist-in-residence program where professional teaching artists work with teachers and students in groups and individually to express themselves in a range of formats. The program culminates in a totally original, professional performance of student-written work that celebrates students' creativity and centers their voices as the writers of the show.[2]

Since April 2020, *Whoopensocker* has turned to the creation of digital curricular materials to provide opportunities for students to experience their writing translated into digital arts. Our traditional program involves university staff, professional teaching artists, and classroom teachers working together to support students' creativity. Supporting Whoopensocker activities without face-to-face interaction meant first creating curricular resources for virtual classrooms. We needed to translate these face-to-face partnerships into digital, asynchronous activities. Our translation efforts had three

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[1]   Grounded in the local, Whoopensocker is a word from the old Wisconsin dictionary that means, "something extraordinary of its kind"

[2]   More information about the program can be found here: https://place.education.wisc.edu/youthprograms/uw-community-arts-collaboratory/whoopensocker/

goals: 1) ensure materials were easily accessible, 2) allow for synchronous and asynchronous access and, 3) produce work in familiar digital formats. We created a series of digital curricular units, each based on one of our in-person artist-in-residence days. Units such as "True Story Day"[3] and "Scriptwriting"[4] include a 10-15 minute instructional video as well as podcasts and videos created by professional artists featuring stories from our archive of prior work to guide virtual teaching practice.

A cornerstone of the *Whoopensocker* model is the gradual release approach (Fisher & Frey, 2008) that scaffolds risk taking for students so that by the end of every classroom session, students are fully prepared to write on their own. We aimed to recreate the "I do, we do, you do" model that has proven so effective in our face-to-face programming. Each lesson begins with a whole group review of positive agreements that encourage collaborative work, support of others, and respect for your own ideas as well as a physical warm-up that embodies the writing lesson. For example, the "True Story" instructional video includes a game called, "The Winds are Blowing" where students express personal connections and preferences by moving in and out of the circle based upon how they identify with various statements. We find that beginning with a game builds student focus and introduces the specific lesson of the day. Students are then asked to comment upon the examples of writing to reinforce literacy concepts and content elements. Only after engaging with several examples are students asked to write on their own.

A key feature of the *Whoopensocker* program is the creation of a professional performance of student-written work. In the virtual space, we continued this work with a collaboratively designed YouTube performance[5]. Our teaching artists created a series of performance pieces that maintained that intimate connection of live theatre with fidelity to student work. Our online show used writing from our most recently completed classroom residency and was shared synchronously at a viewing party with classroom teachers, students, and families and made available asynchronously as well.

RESULTS

We will discuss the outcomes of our work using the four principles of the "distributed instructional model" that guides the design of environments where young people were engaged in creative expression through making art using digital technologies (Halverson, Lowenhaupt, & Kalaitzidis, 2015).

Mentorship as instruction: A shift from didactic to relationship-based teaching

Whoopensocker has shifted our concept of teacher-as-singular-expert to a series of mentoring relationships among classroom teachers, teaching artists, and students. Our curricular resources have been co-designed through co-engagement in creative expression. Teaching artists imagined students would produce traditional written narratives in response to the curricular videos; a classroom teacher encouraged her students to use Flipgrid to share their true stories with everyone. We then passed this format along to a different school's program who were previously unfamiliar with Flipgrid as a collaborative, creative resource for their students.

Creating resources allows learning to happen asynchronously

Asynchronous interaction is a key feature of virtual learning where resources developed at one time can be used to support learning at another. We used video conferencing technologies to synchronously design video curricular resources and performance pieces for asynchronous use. *Whoopensocker* artists became expert video, audio and animation editors. We developed a process to complete production asynchronously through email and google drive communications. We learned to engage in filmmaking processes like the creation of "rough cuts" to allow for productive critique and to best take advantage of everyone's skill sets. This design principle most closely resembles the "flipped classroom" approach promoted in higher education settings.

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3 https://www.learninginthemaking.org/true-story-day

4 https://www.learningingthemaking.org/scriptwriting

5 https://www.youtube.com/watch?v=FdsdxUn3QMg&t=783s

Collaborative & extended networks redefine the boundaries of the learning environment

Our reliance on virtual networks greatly enhanced the tools, resources and environments we used to create curricular resources. We formed cross-functional networks of diverse teams of artists and educators through digital tools such as Google Drive, Google Classroom, Flipgrid, and iMovie, YouTube, and podcasts. We expanded our people network to include artists and educators living outside of Madison. When physical presence is no longer required, collaborative networks can expand across time and space to include teaching artists around the world (even in China!)[6]

Distributed assessment invites demonstrations of learning across the network

While we did not set out to a new assessment system, we ended up building new opportunities for critique and feedback. Students stories received feedback from educators and teaching artists across our technologies. Classroom teachers could mediate exchanges between students and teaching artists and to provide iterative feedback on student stories. The *Whoopensocker* viewing party featured a live chat window accessible to all students and educators watching the performance. Students and teachers responded to stories with comments like, "Great story!" and "I love this one," and provided real-time feedback on performances with comments including "HOW DID THEY DO THAT?!" and "that was beautiful". These real time reactions to creative expression became more authentic forms of assessment than most of the tools we had designed to measure the impact of *Whoopensocker* on student engagement.

IMPLICATIONS

Whoopensocker supports teachers to engage students in creative expression means through a distributed instructional model that allows for collaborative emergence of artistic and literacy expression (Sawyer & DeZutter, 2009). A distributed network shifts the focus of teaching from curriculum-dominant to student-driven. Sometimes collaborative emergence means providing new possibilities for teachers. One teacher told us: "I have been thinking and thinking about how to 'teach' a writing lesson virtually and was finding it impossible. Thanks to you, it is done." Other times, our work serves as an inspiration for classroom teachers to engage in their own practice, for example by playing the improv games suggested by the curriculum with her students synchronously via zoom. And in other instances, it is the classroom teachers who are innovating on practice by bringing in their already existing creative expression tools to our work as with the teacher who encouraged her students to create their own Flipgrid performances. From a design perspective, collaborative and extended networks open up possibilities for different productive arrangements across people, tools, resources, and environments. The biggest takeaway from our work is that **teaching is a distributed act that stretches across people, resources, tools, environments, and time**. As a result, our primary recommendation is to draw on partnerships with teaching artists, kids, and the myriad free digital resources and tools used for creating and sharing art. Do not be afraid of collaborative emergence; not only is it ok if you don't know all the answers or if you don't know what the end result will be. Collaboration and emergent work are the outcomes.

FUTURE RESEARCH

As we create and share these resources, we are collecting data on what happens when the creative production process, by necessity, moves online. What kind of impacts occur when a group of teaching and performing artists firmly rooted in the discipline of theater suddenly find themselves transferring to computer supported collaboration to generate creative work with kids, teachers, and with one another? Early results include an impressive amount of learning on behalf of the artists as they work to construct and "make meaning" in a new medium, including various artistic innovations. As described above, educators have had to acquire new knowledge and skills for representing their storytelling virtually, utilizing apps like iMovie and Talkr. Moreover, familiar modes of theatrical storytelling, like puppetry, have transformed into seemingly parallel screen modes like stop-motion animation, yielding unexpected artistic innovations.

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[6]   Having a Chinese teaching artist was crucial to the performance of a story written by a bilingual student whose story included a character with a Chinese name. In the virtual world, this was easily accessible to us.

The digital theater-making space also seems to impact creative collaboration in novel ways. While platforms like Google Meet and Zoom appear to interfere with the natural *momentum* of discourse so often associated with the ideation phase of group creativity, their designs also provide "chat" features which allow participants the chance to contribute ideas and resources and to provide real time feedback that would otherwise be lost in face-to-face lessons and performances.

As we continue to support teachers in their use of digital technologies for learning, we are learning to take an expansive perspective on performing artists' creative capabilities and representational "reach" for communicating young people's narratives. This learning will undoubtedly carry over into future artistic work by *Whoopensocker* and may incite teachers currently working within the constraints of online classrooms to also consider the pedagogical and creative affordances of technology as a learning tool for creating, adapting and sharing stories from page to screen.

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Supporting Michigan Educators Through the Transition to Online Learning

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Following the COVID-19 school closures in Michigan, Michigan Virtual developed a six-course series designed to support teachers in their transition to teaching remotely. The courses were developed based on online teaching best practices with careful considerations to the driving factors of building student-teacher interactions and digital tools to support content delivery. Over 800 educators have utilized the resources, representing over 200 unique school districts. Feedback from educators has been overwhelmingly positive and appreciative of the guidance during the transition to remote learning.

INTRODUCTION

When the COVID-19 pandemic closed schools in Michigan in spring 2020, Michigan Virtual identified a need for supporting educators who were in the process of moving their instruction online. Research has shown that teacher preparation programs often fall short in preparing educators for teaching online (DeBruler, 2016; Kennedy & Archambault, 2011; 2012), and new K-12 online teachers report their support is often provided informally by peers (Linton, 2018). Michigan Virtual, a state-funded non-profit, felt a strong obligation to educators to provide targeted professional development (PD) at no-cost, to help them transition to remote learning.

As part of this effort, Michigan Virtual developed a six-course series to support teachers in effective online instruction based on teacher-learner interaction. Research has found that increased teacher-learner interactions in online courses increases learners' success (Hawkins, Graham, Sudweeks, & Barbour, 2013) and learner course satisfaction (Kwon, 2019; Lin, Zheng, & Zhang, 2016). Course content came from multiple sources, including Michigan Virtual's onboarding course for new online teachers, the Learning Continuity Readiness rubric, resources from the Professional Learning Portal, and staff experts on blended learning and instructional design.

The courses were built around the larger framework of the *National Standards for Quality Online Teaching* and *Course*s (Virtual Learning Leadership Alliance & Quality Matters, 2019a; 2019b), research-supported standards updated by online learning researchers and practitioners. The courses serve as a introduction to several of the National Standards for Quality (NSQ) Online Teaching, including Professional Responsibilities (Standard A), Digital Pedagogy (Standard B), Community Building (Standard C), Learner Engagement (Standard D), Diverse Instruction (Standard F), and Assessment and Measurement (Standard G). Participants in the Transitioning to Remote Learning courses will not have met these standards as a result of taking the courses. Rather, they will begin scaffolding at a more basic level to develop the skills necessary to better understand the quality standards teachers can achieve while teaching online. Registration for these courses can be accessed at https://michiganvirtual.org/transitioning-to-remote-learning/.

The courses and supporting resources were developed based on *the PD Learning Cycle Framework* developed by EdSurge (2014) in which effective PD cycles through four phases:

- *Engage*. Educators engage with coursework and through peer-to-peer interactions facilitated by discussion boards, Padlet, and Flipgrid.
- *Learn*. Educators learn the course content through various means and modalities with an emphasis on building knowledge and practicing skill.
- *Support*. Educators receive support informally in the course and through social media groups.
- *Measure*. Educator experiences are extensively measured to determine effectiveness and to continue the process of course improvement.

Transitioning to Remote Learning Course Series Process

Michigan Virtual developed the following Transitioning to Remote Learning Courses:

1. Getting Started https://michiganvirtual.org/course/transitioning-to-remote-teaching-1-getting-started/ Introduction to the basics of remote teaching with a readiness checklist, rubric, and video examples of remote teaching.
2. Communication Online https://michiganvirtual.org/course/transitioning-to-remote-teaching-2-communication-online/ The importance of developing and sustaining relationships via online communication, with an extensive list of tools to explore and a reflection through Flipgrid.
3. Digital Content https://michiganvirtual.org/course/transitioning-to-remote-teaching-3-digital-content/ Lesson planning versus instructional design, including finding and vetting digital content, and creating digital content.
4. Digital Assessment https://michiganvirtual.org/course/transitioning-to-remote-teaching-4-digital-assessment/ Remote learning assessment possibilities.
5. Adapting to Meet Needs https://michiganvirtual.org/course/transitioning-to-remote-teaching-5-adapting-to-meet-needs/ Introduction to flexibility for remote learners and accessibility.
6. SEL Supports https://michiganvirtual.org/course/transitioning-to-remote-teaching-6-sel-supports/ Social emotional learning support for students, families, and educators during distance learning.

The content was packaged into six two-hour courses instead of a longer single course, allowing educators to select the content most relevant to their needs at the time. This aligns with Malcolm Knowles' Theory of Andragogy (1984) which states that adults learn best when the information is immediately relevant to their work. Educators were also provided opportunities to connect with one another. Data from previous enrollments end of course surveys indicated that educators valued sharing experiences with their peers. Content was also organized in alignment with Michigan Virtual's Teaching Continuity Readiness Rubric available at https://michiganvirtual.org/learning-continuity/.

The courses were not facilitated. The content was shared at an introductory level with the goal of increasing confidence in remote teaching. In developing these courses, there was a focus on modeling course design and demonstrating examples of different elements such as outlines and checklists (see Figure 1), reflections, automated assessments, digital content creation (see Figure 2), self-evaluations (see Figure 3) using digital tools, automated assessments, and personalization.

Figure 1. Course Content Overview from Course 1: Getting Started.

Creating Digital Content

Finding great content is helpful, but what if you can't find exactly what you are looking for? You may consider creating it. Please spend no more than 20 minutes exploring the various tools to help facilitate digital content.

↪ **Presentation**

🎥 **Video**

📖 **Digital Books & Podcasts**

- Book Creator - Book Creator allows you to create ebooks that can be read on iPads, Chromebooks, and the web. Create a book using photos and visuals, publish it, and share with your class!
- StoryJumper - StoryJumper is a site that allows learners to create and publish their own books. Learners can add text and images that they have created. Option to purchase digital or hard copy of the book.
- Anchor - Anchor is a simple podcast recording app that allows students to create and distribute their own high-quality audio podcasts.

🖥 **Screencasting**

Figure 2. Course Content Sample from Course 3: Digital Content.

Self-Evaluation

The purpose of this survey is to help you identify the knowledge and skills you already have as a teacher supporting students remotely. This will help you to identify your strengths and identify areas for growth.

Select any options below that apply to you.
Note: If none of these statements currently apply to you, you can leave them all unchecked.

☐ SEL is regularly taught in my face-to-face classroom

☐ I have digital resources to support my students with their social emotional learning

☐ I can embed Social-Emotional Learning (SEL) in my remote teaching

☐ My families regularly receive communication from me to support their students' learning

☐ I practice self-care on a regular basis

Now, count up the number of checkmarks you have. Remember this number for the next section.

[Next]

This form was created inside of Michigan Virtual University. Report Abuse

Figure 3. Self Evaluation from Course 6: SEL Supports.

Research Goals

The goal of this research was to determine if educators were engaging with the course content in the phases identified by the EdSurge (2014) PD Learning Cycle Framework. Specifically, were educators engaging, learning, and supporting one another. The measurement phase, using available data would be used to address the research goals.

RESULTS

Learn

Enrollment

In the first month since launch in April 2020, 883 educators have enrolled in one or more courses. The first course registered over 700 enrollments, each of the six courses recorded over 500 enrollments. The majority of educators were female, secondary classroom teachers.

Satisfaction

The six courses received a 99% satisfaction rating, 3% above the overall average of Michigan Virtual professional learning courses. Educators have been positive about the courses stating, "Content was very timely. It was flexible and customizable." In the end of course evaluation, educators also expressed, "As we switch to remote learning, I am completely overwhelmed. This made me realize that it doesn't need to be grand and over the top, and we have a lot of great tools we can already use." While we have yet to know the student outcomes of educators moving their content online, the available data suggest that a number of educators were satisfied with and learning from the content.

Engage and Support

Course engagement data suggest educators were fulfilling the course development aims of engaging and supporting based on the EdSurge framework (2014). There was 81.3% participation in the tool Padlet in the first course, as well as 98% participation in the discussion post in Adapting to Meet Needs. One tool, Flipgrid was not well utilized, feedback suggests that educators found it difficult to use. While not part of this study, a Facebook group was established as a place for educators to connect with Michigan Virtual staff and receive support. The Facebook group had an early surge in membership, garnering nearly 1000 enrollments within the first several days. As of May 2020 there were over 3,500 members.

IMPLICATIONS

It is clear from the early data that the outcomes from the courses are far reaching and positive. The 883 educators represent 207 different MI school districts, and 27 educators from outside of Michigan. Educators are also taking advantage of the resources by completing them quickly and enrolling in multiple courses. The completion rate for all enrollments is over 50%, and the average time between educator enrollment and completion of a course is just over two days. Additionally, 72.5% participants enrolled in several courses, and about half have enrolled in all six courses.

The results make it clear that large numbers of K-12 teachers are enrolling in, and engaging with the course series. Clearly these courses were filling a need in the field and their content was of immediate value (Knowles, 1984). Knowles (1984) theory also asserts that adult learners learn best experientially, this was reflected in both the course design and feedback from teachers. This research demonstrates as schools and districts move forward with plans to educate students remotely in the future, professional development opportunities in the form of online courses need to be made available to teachers, with varying degrees of experience in remote teaching, to help them transition to this format of teaching and learning. Specifically, courses that model relevant pedagogical strategies to help teachers internalize sound remote teaching skills are most beneficial to teachers.

While the Facebook group dedicated to learning continuity in Michigan was not the focus of this chapter, it was part of the larger strategy around supporting teachers as the courses were specifically designed to be unfacilitated as to not constrict enrollments. The initial surge in membership and steady growth thereafter demonstrated a strong desire for teachers to connect with, learn from, and support one another. While this was certainly a unique situation, it is clear from research (Linton, 2018) and practice that effective PD must include formal and informal teacher communities to truly meet teachers needs. Therefore, school leaders seeking to implement aspects of remote teaching and learning into their educational programs should provide additional opportunities for teacher collaboration beyond the online courses suggested above.

Replication Beyond Michigan

The transition to remote learning is a nation-wide movement, and while the resources developed by Michigan Virtual were targeted towards Michigan educators, the content is applicable to anyone looking for support moving their instruction online. The courses and other resources can be accessed at no cost by anyone through the Michigan Virtual website. Other states looking to provide support for educators can access this work, founded on established frameworks of PD and guided by digital teaching best practices and user feedback. As districts plan for coming school years, it is likely they will utilize more targeted resources with a focus on digital tools and how they can be used with learners.

FUTURE RESEARCH

As Michigan educators continue to look towards the future, there will be an ongoing need to adapt the traditional thinking around education and how to support the changing needs of students. Michigan Virtual will continue to assess these needs and provide responsive, quality PD that is engaging, relevant, and readily available to those most in need. Future research will need to include using end of course surveys to determine widespread response to and perceived effectiveness of the courses. Additional follow ups with educators through social media or other targeted channels will be necessary to determine if their practice has changed and the perceived impacts on student outcomes.

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Leveraging School/University Partnerships to Support the Transition to Online Learning

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To say that the COVID-19 global pandemic created a shift in the lives of people around the world is an epic understatement. The sudden switch to online teaching and learning caught teachers, teacher educators, TCs, PK-12 students, and families off guard. Below we share how a strong school/university partnership served as a foundation for navigating the new online learning reality for our clinically-centered teacher preparation program. Grounded in a shared belief in mutually beneficial partnerships, our experience here illustrates how school- and university-based teacher educators used a variety of platforms and technological tools to maintain the fidelity of course and field experiences in an unanticipated online environment for one new cohort of TCs.

INTRODUCTION

The sudden switch to online teaching and learning amidst the COVID-19 pandemic caught teachers, teacher educators, teacher candidates (TCs), PK-12 students, and families off guard. It was during this time that one cohort of fifteen elementary TCs began their teacher preparation in George Mason University's (GMU's) Elementary Education program. Guided by the Professional Development School's (PDS) Nine Essentials, GMU's Elementary Education program utilizes a "pathways to partnership" model (Parker et al., 2016) to engage in mutually beneficial partnerships that impact PK-6 student learning, clinical teacher preparation (AACTE, 2018; NCATE, 2010), inquiry and teacher professional development (NAPDS, 2008). TCs who began the program in Spring 2020 were immersed in this context as they completed three courses (Elementary Methods, Foundations of Education, and Child Development), one of which was site-based (Parker, Groth, & Byers, 2019), and a 45-hour structured field experience at Washington Elementary (pseudonym), a Title 1 PDS site. Below we share how a strong school/university partnership served as a foundation for navigating the new online learning reality and it brought school-based teacher educators (SBTEs), university-based teacher educators (UBTEs), and TCs together in the shared design and development of technology resources to best serve the Washington community.

INNOVATION

Five key innovations shaped our successful transition to online teaching. First, site-based course instruction, a hallmark of the PDS partnership, created an initial platform for building relationships among SBTEs, UBTEs and TCs (Gallagher et al., 2018; Parker, Groth, & Byers, 2019; Zeichner, 2010; Zenkov et al., 2018) (See Table 1 for resources). When courses are site-based, TCs have opportunities to engage with school staff for observations outside their weekly university course, inclusive of participation in school-based activities and meetings with key school-based personnel. Because the site-based course experience involved Washington Elementary faculty in the application of course content and the actualization of that content in required assignments, they were invested in its continuity into an online format. Leveraging these already established relationships, the UBTEs and SBTEs collaborated to alter each course, brainstorming ideas for modifying assignments, course experiences and expectations, in order to ensure TCs gained the essential knowledge needed in the online format. In turn, UBTEs assisted SBTEs in supporting their own shift to online learning

Table 1
Resources for Creating School/University Partnerships

Building School/University Partnerships	Website Links
National Association for Professional Development Schools	https://napds.org/
American Association of Colleges for Teacher Education (2018).	https://aacte.org/resources/research-reports-and-briefs/clinical-practice-commission-report/
NCATE Blue Ribbon Panel Report (2010).	http://www.ncate.org/~/media/Files/caep/accreditation-resources/blue-ribbon-panel.pdf?la=en

This resulted in the second innovation--converting face-to-face assignments into virtual tasks (Williams, Cameron, & Morgan, 2012; Woo, 2013) (See Table 2 for resources). For example, in the Foundation course, TCs conduct research on a pressing topic impacting elementary teaching and schools. Traditionally TCs share their research during a face to face round table symposium attended by the faculty. This assignment was modified, and TCs were introduced to Screencast-O-Matic, a video recording tool (https://screencast-o-matic.com/). TCs recorded screencasts of their presentations which were then 'presented' to faculty to maintain an authentic, albeit virtual audience. In turn, faculty provided video feedback to TCs to deepen their reflections and support their application of those topics to future practice (Borup, West, & Thomas, 2015; Hodge, & Chenelle, 2018).

Our third and fourth innovations emerged from the loss of the face-to-face field experience (See Tables 1 and 2 for resources). We began by tapping into the expertise of our SBTEs (AACTE, 2018; Czerniawski, 2019; White et al., 2015). After identifying course topics that were most impacted by the loss of access to 'real' classrooms, we invited SBTEs in to serve as guest lecturers and co-instructors. The response was overwhelming. SBTEs joined online synchronous sessions of Blackboard Collaborate Ultra and WebEx for discussions of classroom management, teacher language, the special education referral process, working with English Language Learners and connecting students from low economic households to technology for distance learning. We also incorporated Google Slides as a tool for online breakout groups to report small group dialogues, serve as parking lots for future discussion, and promote active participation. Indicative of PDS tenets, many of the SBTEs, who joined as guest speakers, subsequently embedded this tool into their own online PK-6 instruction. In addition, we advocated for high quality video resources (Teaching Channel (https://www.teachingchannel.com/) and Atlas (https://atlas.nbpts.org/cases/) to create opportunities to witness, pause, reflect, and discuss elementary methods and management in action. This scaffolded TCs' understanding of the content online mimicking what they would have experienced if engaged in site-based instruction.

Table 2
Virtual Tools for Supporting the Transition to Online Learning

Virtual Tools for Supporting the Transition to Online Learning	Website Links
Screen Recording Tools • Screencast-O-Matic • Camtasia • Apowersoft	https://screencast-o-matic.com/ https://www.techsmith.com/video-editor.html https://www.apowersoft.com/free-online-screen-recorder
Video Conferencing Tools • Zoom • WebEx • Blackboard Collaborate • Google Meet • Microsoft Teams	https://www.zoom.us/ https://www.webex.com/ https://www.blackboard.com/ https://meet.google.com/ https://www.microsoft.com/en-us/microsoft-365/microsoft-teams/group-chat-software
Tools for Creating Engaging Online Classes • Theresa Wills – Free Professional Development • Flipgrid • Nearpod • Peardeck • Google Classroom • Kahoot • NowComment	https://www.theresawills.com/ https://info.flipgrid.com/ https://nearpod.com/?ph=1 https://www.peardeck.com/ https://classroom.google.com/u/0/h https://kahoot.com/schools-u/ https://nowcomment.com/
Tools for Classroom Exemplar Videos • Atlas/National Board for Professional Teaching Standards • The Teaching Channel	https://atlas.nbpts.org/cases/ https://www.teachingchannel.com/
Tools for Virtual Field Experiences • Simschool • VRsatility • Virtual Classroom Tours	https://www.simschool.org/home/simschool/ https://www.gse.harvard.edu/news/19/09/virtual-reality-teachers https://www.oise.utoronto.ca/balancedliteracydiet/Virtual_Tours/index.html

Finally, our fifth innovation, representative of the reciprocal nature of partnership, was providing resources and support for our PK-6 school partners (NAPDS, 2008) (See Table 3 for resources). For example, the UBTEs were able to facilitate finding a low-cost solution for obtaining technology access for families in the community who did not have reliable internet capabilities through programs offered by Comcast and Spectrum (Noonoo, 2020). Also, UBTEs and TCs identified resources and strategies to support Washington's efforts to engage families in their children's online learning by connecting them with free resources (e.g. https://www.learningkeepsgoing.org/). Moreover, TCs researched and shared with their SBTEs online free resources to support literacy (e.g, Epic Books (https://www.getepic.com; Raz Kids (www.raz-kids.com), and math (e.g., Zearn (www.zearn.org) instruction.

Table 3

Resources for Families and School Partners to Support Access to Online Learning

Technology Access Resources for PK-6 School Partners	Website Links
Learning Keeps Going	https://www.learningkeepsgoing.org/
Free/Reduced Broadband	https://www.highspeedinternet.com/resources/are-there-government-programs-to-help-me-get-internet-service
Raz Kids	www.raz-kids.com
Zearn	https://www.zearn.org/
Storyjumper	https://www.storyjumper.com/
Storyline Online	https://www.storylineonline.net/
Scratch	https://scratch.mit.edu/

RESULTS

Several findings emerged from our initial reflections. We were struck by the powerful role our school-university partnerships played during the transition to online learning. SBTEs readily volunteered to assist with online sessions, and UBTEs reciprocated by identifying resources for Washington. The inclusion of SBTEs early and often in our online courses, alongside high-quality online video repositories, created instances in which the course objectives were playing out in real time and TCs remarked how these points of technology positively impacted their learning. Additionally, it was from this partnership that the Washington Elementary community, inclusive of leaders, teachers, students and families, accessed free online resources, developed more innovative online instruction and created a robust online learning community from day one of its implementation. In true PDS partnership, UBTEs, SBTEs, and TCs learned from each other.

IMPLICATIONS

There are multiple implications of this work for all stakeholders. First, web-based meeting/teaching platforms can support bringing SBTEs into university classes as guest instructors (James Kaplan, Howard, & Larison, 2013). Their expertise is such an important voice in clinical teacher preparation but it is one that is often silenced due to the siloed work of schools and universities and rigid daily work schedules. Online tools such as WebEx and Blackboard Collaborate bring SBTEs into university classrooms without all of the associated logistical challenges (See Table 2 for resources).

In addition, the rapid move to online teaching highlighted a pressing need to understand the pedagogies of online teaching, particularly in elementary settings (Lawrence, 2020; Phirangee, 2013; Timonen, 2019). While the university's move online is just a beginning for introducing TCs to online teaching tools, more needs to be done to enhance their preparation (Luo, Murray, & Crompton, 2017; Shepherd, Bolliger, Dousay, & Persichitte, 2016). Merely experiencing online teaching is not sufficient for preparing TCs to teach elementary students virtually. Infusing resources such as Google Classroom (https://classroom.google.com/), Flipgrid (https://info.flipgrid.com/), and Pear Deck (https://www.peardeck.com/googleslides) into teacher education courses enables TCs to experience and explore online tools as students and creates opportunities to develop online teaching pedagogies (Cooper, Farah, & Mrstik, 2020; Pulham & Graham, 2018) (See Table 2 and Table 3 for resources). Having TCs design lessons and co-teach with SBTEs using online technologies provides authentic learning experiences and allows TCs to see the affordances and limitations of each technology. Finally, during their clinical experiences, TCs need the same opportunities to engage in instructional cycles online as they have in face-to-face teaching.

Another technology implication is the number of PK-6 students who lacked the technology and Internet access for online learning (Broom, 2020; Song, 2020; Strauss, 2020). While Washington Elementary provided as many families with a laptop and Internet access as possible, in some cases one laptop had to be shared among multiple students within the same household. This digital divide created a delay in online learning as the school district worked to ensure all stu-

dents had the requisite technology access (See Table 3 for resources). This disparity illustrated and fueled discussions in the Foundations course, as it highlighted the importance of working collectively as a society to rectify this problem.

Undergirding our implications is the power of school-university collaborations and PDS partnerships. Each of the innovations above came to fruition because the orientation of the UBTEs and SBTEs is that schools and universities are equal partners in teacher education (AACTE, 2018; NAPDS, 2008). This dedication to building and sustaining authentic relationships meant the school/university partners did not cut ties and retreat into their own silos when face-to-face learning ended, but rather (and almost immediately) sought out how they could collaboratively use technology to support each other within this new instructional landscape (See Table 1 for resources).

FUTURE RESEARCH

Future research should consider the responsive capacity of SBTEs, UBTEs, and TCs in the midst of the pandemic and the mutual roles played to best serve the school's ecology. In particular, research should highlight how partnerships informed knowledge, implementation, pedagogy and evaluation of online learning both at the PK-6 and university levels. In addition, as teacher education programs turn to technology infusion (Graziano et al., 2020), rather than stand-alone technology courses, research is needed as to the effectiveness and sustainability of this model, particularly in clinically-centered teacher preparation programs (Sprague, Parsons, & Parker, in press). Since it is not yet clear when field experiences will be able to resume, alternative formats for clinical teacher preparation need to be explored (see Table 2 for resources). Research into these virtual structures and their affordances for enabling TCs to connect theory and practice are necessary for ensuring continuity of experiences.

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Supporting Teachers Where They Are: The Community Partnership Schools™ Model

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A community school brings resources from the community into the school to improve student academic achievement and well-being, educational equity, and family and community engagement. The Community Partnership Schools™ model of community school engages four core partners at each school who collaborate to deliver high-quality programs and services to students. During the COVID-19 pandemic, 26 Community Partnership Schools across Florida have developed methods to improve student outcomes by addressing the following questions: How can we continue to meet the needs of our students and families virtually? Is there any way we can support teachers as they provide virtual instruction? What potential needs may arise? What ways can we continue to engage with our communities? This paper brief explores the power of partnership in Community Partnership Schools and highlights the innovative strategies core partner staff have implemented to continue delivering academic, medical, and social services using virtual applications and systems.

INTRODUCTION

Community schools bring together resources to enhance education and overcome barriers to learning (Dryfoos, 2005). According to the Children's Aid Society (2011), community schools share a common mission "to change the role of education in the lives of students, families, and communities, so that underserved youth may be empowered to overcome obstacles and become happy, healthy and productive adults" (p. 6).

At the epicenter of community school activity is a partnership that unites individuals from schools and communities who share a purpose and vision (Ellis, 2020). The UCF Center for Community Schools promotes the development of community partnerships that include four core partners – a school district, a nonprofit, a healthcare provider, and a college or university. This is called the Community Partnership Schools™ model. Currently, 26 schools across Florida are implementing the model. Core partners at each Community Partnership School (CPS) work together through the CPS central office, or "HUB," to provide academic support; enrichment opportunities; and behavioral, medical, and dental care for students, families, and the local community (UCF Center for Community Schools, 2019).

The Community Partnership Schools™ model has a solid infrastructure that meets the needs of teachers, administrators, students, families, and communities, especially in times of crisis or global pandemic like COVID-19. CPS staff, including directors, extended-learning coordinators, wellness coordinators, and family and community engagement coordinators, are still providing programs and services; however, during school closure, they are supporting teachers and students where they are using virtual applications and processes.

INNOVATION

Following guidelines recommended by the CDC, the state of Florida closed K-12 public schools in mid-March, posing additional barriers to student success. School closures have prompted the UCF Center for Community Schools staff

and the CPS staff along with teachers and administrators to collaborate on virtual approaches to provide support and access to resources.

The UCF Center for Community Schools has increased its use of Microsoft Teams to collaborate internally on efforts to assist the Community Partnership Schools (CPSs). Through Microsoft Teams, the center has been able to schedule meetings to continue discussions that would typically occur in the office (see Figure 1). The communication/collaboration platform has enabled the center to maintain and, in many cases, increase its productivity. It also has allowed the center to effectively plan trainings for the 26 CPS directors, each of whom is employed by a nonprofit core partner.
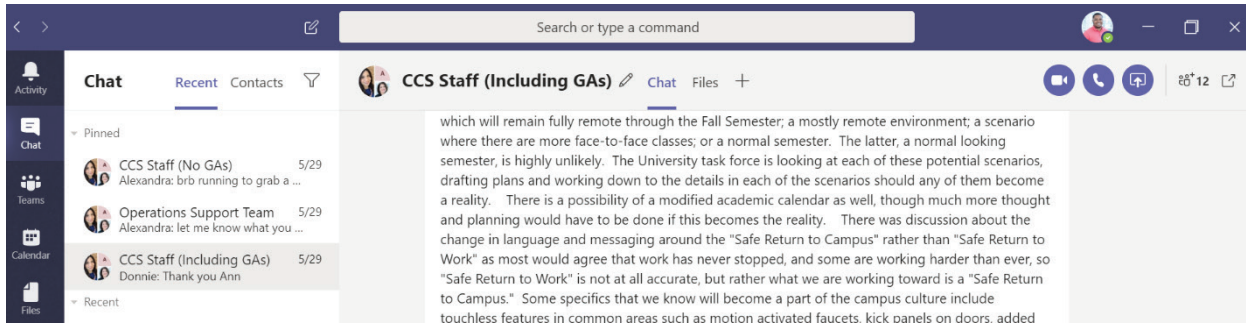
Figure 1. Screenshot of Microsoft Teams.

The center needed a virtual platform that could host multiple attendees and allow for continuous engagement. Through Zoom, the center has hosted a Virtual Town Hall on the impact of COVID-19 on CPSs, Director Network Calls and quarterly learning exchanges, and Technical Assistance Sessions (UCF Community Partnership Schools Network News, 2020, p.2). Zoom has enabled the center to present, discuss and collaborate virtually on topics that directly affect the directors' ability to serve teachers, students, families and community — an impact that extends well beyond the calls themselves (see Figure 2). Zoom's videotelephony and online chat services have provided fluid engagement and can be used more broadly. Research has shown that individuals generally do better recalling information when they are able to be active participants during presentations (Dale, 1969). Zoom's platform can be used by educators as well for professional trainings and virtual classes, as educators can provide free basic Zoom accounts, which currently have no time limit for K-12 users affected by the coronavirus (Zoom, 2020).

Center Remains Fully Operational UCF Center for Community Schools' staff members are currently working remotely. However, the center remains fully operational and committed to supporting the state's Community Partnership Schools. The center uses Zoom to host virtual town halls and network calls with CPS directors to share updates and discuss strategies and experiences. Center staff members have developed and shared a variety of online resources for the directors as well, which they continually update. See Who's Who at bit.ly/3ay73Ju for current contact information for each staff member.

Zoom call with CPS directors

Figure 2. Screenshot of Zoom Townhall.

The center also has assisted by providing CPS directors with information to share with teachers and parents that is housed in the center's Director Resource Library and distributed through Dropbox. The information has included updates on expanded-learning resources, organized by academic level and subject area, and a COVID-19 Toolkit with additional web-based resources, all housed in the library which can be accessed by directors here https://tinyurl.com/y7thl3vk.

RESULTS

Many CPS directors have helped lead their school's transition to a virtual environment as they have felt more empowered within their roles through the support provided by the center. At OCPS Academic Center for Excellence (ACE), the CPS director and staff have modified the delivery of the New City Kids Program, a daily afterschool program targeting all grades, to a virtual format; students were provided access to digital devices. The modified program focuses on academic support, social development, health and wellness and crisis intervention (New Image Youth Center, 2020). The Director Resource Library, with links to virtual expanded learning opportunities and health and wellness resources, has been an added resource for staff to help them collaborate on programming when needed.

Endeavour Elementary was providing in-person Adult Education ESOL classes to non-English speaking families in the community, and these classes are now provided virtually to further ease the language barrier. Recognizing that some families face obstacles gaining internet access, the center has included in the Director Resource Library a section dedicated to technology resources, which provides information on how to receive free internet service.

The most important strategy for CPSs is to create systems and processes that address the needs of the whole child, allowing teachers to focus on instruction. CPSs have become the focal point of resources for students and families through a physical "HUB." Social distancing measures led Evans High School CPS staff to develop a "Virtual HUB" to increase access to resources, which they routinely update and is available at https://tinyurl.com/y8hmg33r (Evans High School, A UCF-Certified Community Partnership School, 2020).

Students find it hard to learn when they do not have a full stomach. One graduating senior wrote that he and his family benefitted from uninterrupted food pantry services because of Evans' Virtual HUB: "The HUB helped me by providing me with support, encouragement, and food packages, which helped with the situation we were going through. Being a family of 5 in a 1-bedroom apartment, the HUB helped me to stay focus[ed] and not think too much about what was going on in life at times. I am thankful for the support that I received." (see Appendix A: Do You Need Wellness Support?)

At Keystone Heights Junior/Senior High, CPS staff are leveraging their connection to the community to learn about the household needs of students and families using a private survey. The CPS staff also survey teachers to ensure their needs are met, allowing the teachers to focus on supporting students. The survey is available at https://tinyurl.com/yc9ge2ay. In addition, the CPS staff created a form to solicit volunteers to help them communicate with students and families about resources. The form is available at https://tinyurl.com/ydx9j9fv (Keystone Heights Junior & Senior High School, A Community Partnership School, 2020).

Teachers at OCPS ACE said they felt supported by CPS staff, volunteers, and community leaders who provided tutoring during the school's virtual Homework Café, an afterschool program. This support freed up the teachers to pursue professional development by serving as leaders of sessions within the café. The sessions also led to opportunities for extended learning among students. For example, one teacher invited students and families to participate on a field trip in her backyard, an exercise that families could replicate at their own home (see Appendix B: Homework Café: Virtual Edition). One virtual Homework Café had 1,700 views of nine published videos from 200 unduplicated viewers.

Additionally, OCPS ACE created a resource guide through collaborative leadership between the principal, teachers, and CPS staff. The guide has helped students and their families continue to receive resources during the pandemic, including family safety, digital learning, financial assistance, family health, and other family resources. This guide is available at https://tinyurl.com/yb6gev4e.

IMPLICATIONS

Like CPS directors and coordinators, teachers are well-positioned to understand the needs of students and the importance of learning that occurs beyond instructional time. To help students, families and communities in need, as well as to provide professional development opportunities for teachers, schools may leverage teachers as community leaders.

Using a collaborative leadership approach, school administrators and lead teachers can replicate systems that follow a whole-child approach. These include systems integral to the Community Partnership School™ model (https://ccie.ucf.edu/communityschools/partnership-schools/) and the Whole School, Whole Community, Whole Child (WSCC) model, which has been recommended by the American Institute of Research (2020).

School administrators can also select lead teachers to coordinate other teachers in developing a virtual toolkit for students, families, and staff. During this process, schools can leverage an administrator (e.g., an assistant principal dedicated to instruction or a curriculum resource teacher) to collaborate with the lead teachers to identify core areas in which academic support is needed such as by grade-level or subject area (see Appendix B: Homework Café: Virtual Edition).

Recommendations to support teacher instruction, in-service and professional development include establishing structured systems and processes. Create a needs assessment for teachers, students, and families to discover the immediate, secondary, and tertiary needs. Develop an asset map to identify current resources — time, talent, treasure for teachers and administrators as well as students and their families. Empower teachers to reach out to partner providers to ask them to support their virtual classroom instruction. Finally, take advantage of free online tools and applications that are accessible and instructor-learner friendly, such as Dropbox, Zoom Basic, and Google Forms, Hangouts, and Meetup.

FUTURE RESEARCH

As we move forward in this new normal, teachers will require more support than in the past as they work to provide quality virtual instruction to students. One future research avenue is to specifically request data on innovative teacher practices that can be replicated in the field. An additional study would be to create a needs assessment to administer to teachers that would help address their needs in the areas of in-service, teaching and instruction, and professional development.

When assessing all the virtual resources available to support teachers, it is important to consider that the awareness can vary vastly among in-service educators. With this understanding the focus on collaborations among teachers can be the key to unlocking the full potential of currently available resources. Collaboration among staff can strengthen instruction when teachers have coordinated access to virtual instructional resources and a platform to share their knowledge of curricula, educational platforms, technology fluency, and other topics. Effective lessons can be created by integrating resources and tools that extend beyond the classroom to support students and families and to limit any gaps in academic progression during virtual instruction.

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DO YOU NEED WELLNESS SUPPORT?
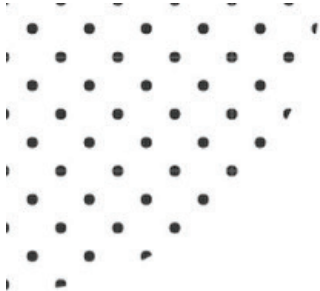
HEY, DO YOU NEED WELLNESS SUPPORT?

- MEDICAL & DENTAL ASSISTANCE
- FOOD PANTRY
- ACCESS APPLICATIONS
- EMOTIONAL & MENTAL SUPPORT
- SOMEONE TO STOP AND LISTEN
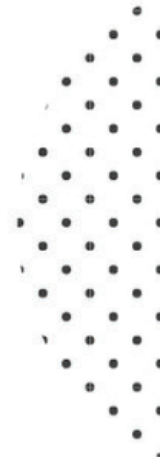
WE'RE HERE FOR YOU.

If you are in need of any of the services above, please reach out.

(318) 723-7473
rebecca.beusejour@ocps.net
@ evanshighhub

APPENDIX B

OCPS ACE LIONS VIRTUAL RESOURCE GUIDE:

COVID-19 RESOURCES

Together in Education, Apart from Brick and Mortar:
Rapid Professional Development for Online Distance Learning

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In response to school closures as a result of the COVID-19 pandemic, the U.S. elementary school in this study held a week long training program to prepare teachers for online Distance Learning. The training was a three stage professional development program that can be replicated in other schools. The program focused on: 1) online teacher professional development, 2) peer mentoring, and 3) administrators acting as Instructional Leaders in the role of co-teacher.

INTRODUCTION

COVID-19 propelled internet usage from an educational choice - to an absolute necessity. Nachmias et al. (2008) writes that the internet "creates multiple space and time of learning: within school, outside school and in nontraditional learning settings" (p. 177). Even prior to the pandemic, the internet was being utilized at every level of education (Barbour & Reeves, 2009; Nguyen, 2015; Smith et al., 2016). It has even been touted as a means of preparing preschoolers for kindergarten (Schacter & Jo, 2016). Despite its popularity, many schools were unprepared when required to go fully online. Online teaching requires a unique skillset (Smith et al., 2016, p. 176). It requires knowledge of "pedagogy, technology, and content" (DiPietro, Ferdig, Black, & Preston 2008, p. 11). Few teacher training programs even cover it (Kennedy & Archambault, 2012).

This study focuses on how administrators at a K-5 school in Arizona prepared in-service teachers for online Distance Learning (DL) through a three stage process. The school is a Title I school and 40% of the student body is on free and reduced lunch. Administrators had to ensure that every student had a device and internet access and that teachers were trained. For the purpose of this paper, DL is defined as remote learning with the use of online technology (Burdina, Krapotkina & Nasyrova, 2019). The school has 17 in-service teachers and there is a wide spectrum of experience with online educational tools within that group. Staff were informed on March 20, 2020 that school would transition to DL, training began on March 23, 2020, and full DL began on March 30, 2020.

INNOVATION

Implementation of DL began by choosing an asynchronous education model through an online Learning Management System (LMS). Google Classroom (GC) was selected through collaboration between administrators and the district. GC is popular because it is free, cloud-based, mobile-friendly, and has unlimited storage (Iftakhar, 2016). The next step was to ensure that teachers could easily use GC. This was done in three stages that began with online teacher professional development (OTPD).

Stage 1: Online Teacher Professional Development

Through OTPD, professional development (PD) can be provided anytime, on any device, and over vast geographical distances (Chen et al. 2009). This makes OTPD ideal during a crisis. OTPD includes nearly any educational endeavor online and has been shown to increase technical skills while also allowing participants to learn other topics (Renninger & Shumar, 2004). Therefore, teachers can learn GC while also improving their computer skills. Additionally, OTPD supports collaboration (Park et al., 2007) and so it was used to pair teachers together for mentoring.

Implementation

Prior to training, teachers were provided various resources for GC (see Appendix A). One tutorial that was utilized is "Getting started with Google Classroom: EdTech made easy - Google Classroom tutorial." It explains the process of developing a classroom, walks the viewer through the steps, and allows for review as often as necessary.

OTPD was held via Google Hangout. The administrator created a GC while teachers observed through screen sharing and asked questions. This meant that teachers used one technology in order to learn to use another. Dorner and Kumar (2016) contend that this method provides teachers "opportunities to learn about pedagogical technology application, experience it themselves as mentees, and later on implement it in their own practice" (p. 53). Mentoring was the second stage of training.

Stage 2: Peer Mentoring

Smith (2007) describes mentoring as "a particular mode of learning wherein the mentor not only supports the mentee, but also challenges them productively so that progress is made" (p. 277). Online mentoring presents the opportunity to diversify ideas and resources (Rodesiler & Tripp, 2012). Mentoring, particularly online, provides an opportunity for collaboration and to make instructional adjustments. Rodesiler and Tripp (2012) write, "teachers may connect with one another, pose inquiries, exchange resources, and share ideas" (p. 135). In this sense, crisis circumstances provide an opportunity for professional growth.

Implementation

Mentor/mentee interactions should focus on learner needs (Bearman et al., 2007). Given this, teachers were informally connected using a skills based method. Mentor/mentee relationships were established based on observation and brief discussions with teachers. If a teacher felt they had a knowledge gap, they were connected to another teacher who had mastered that skill. If the majority of teachers lacked a skill, a teacher with that skill acted as a "group mentor" and presented to everyone (Smith, 2007). When possible, teachers were paired with familiar colleagues. Sinclair (2003) explains that online mentoring cannot replace human interaction and connection between individuals should exist prior to mentoring online. Teachers who had a high level of comfort with one another were added as students to each other's classroom so they could learn from each other and problem solve together.

Stage 3: Administrators as Instructional Leaders (ILs) in the Role of Co-Teacher

Principals can have a significant impact on teaching (Hallinger, 2011). They are often expected to be both ILs and school managers (Neumerski, 2013). Instructional Leadership (IL) can be defined as behaviors and activities used to improve school outcomes (Shaked, 2020; Brazer & Bauer, 2013; Neumerski, 2013). IL is encouraged because research shows that it has a direct impact on student academics. After analyzing empirical studies related to differing leadership models between 1978 and 2006, Robinson et al. (2008) found "the closer educational leaders get to the core business of teaching and learning, the more likely they are to have a positive impact on students' outcomes" (p. 664).

Implementation

Administrators were placed in a co-teacher role in the GC platform in order to allow them to provide assistance and feedback to teachers - key functions of IL. Administrators regularly checked GC to ensure that assignments were given

and a daily greeting was posted. However, more importantly, they provided on-going individual and school-wide feedback. Administrators' observations mimicked "walkthroughs" during in-person school. This allowed teachers to refine their online skills. Additionally, by placing administrators in the role of co-teacher, camaraderie among staff was observed. Keys to successful DL include the establishment of a sense of connection and community (DiPietro et al., 2008; Garrison, 2007; Volery 2001) and this was partially accomplished by the roles established in GC.

RESULTS

Some teachers participated in online professional learning communities outside of the district. Administrators were skeptical about the quality of outside opportunities. However, resource sharing among staff could have made opportunities more well-known. Online learning communities outside of an individual's district is one of the most widely used methods of PD for educators (Greenhow & Askari, 2017). A Google Doc for sharing resources should be created to ensure communication.

Anecdotal evidence shows that teachers being added to one another's classroom as a student was beneficial for initial rapid learning and makes peer mentoring less formal. Grade level teachers should follow each other's classroom instruction for collaboration purposes.

IMPLICATIONS

In order to select the right LMS for your school, Cognia (n.d.) provides excellent guiding questions for educators. It is important to note that there are many platforms that claim to be a LMS. It is essential to use an established platform as some newer programs crash easily. If using GC, utilize tutorial videos and instructional articles (see Appendix A). Trainers should send resources out prior to live session(s). Live session(s) should then utilize screen sharing and inquiry should be encouraged.

In terms of mentoring, the first priority should be skills training but relationships should be considered. Teachers that have a good relationship with one another should be paired together. This allows for a higher level of confidence because the mentor relationship depends on trust (Rymer, 2002). In GC, teachers should be added to each other's classroom as a student and allowed to observe each other's teaching methods.

Administrators must utilize IL and can do so in the co-teacher role in GC. In the school studied in this paper, early-career teachers (ECT) were noted to need particular assistance with pedagogy during DL. Neglect of ECT's, especially during a crisis, can be detrimental. The administrator can provide scaffolded pedagogical "coaching" for these teachers (Tang et al. 2014). For others, administrators can follow-up on attendance, grades, and other time-consuming matters that might prevent teachers from focusing on lessons and community-building with students and one another.

FUTURE RESEARCH

The school in this study will begin DL summer school on May 26, 2020. To ensure that opportunities are widely circulated, the administrators will create a shared resources Google Doc prior to the start of summer school. This was a recognized shortcoming of the earlier processes.

A mixed methods study of teacher perceptions of DL training will be conducted. A survey (see Appendix B) will be provided to all teachers. Later, teachers will be asked for voluntary participation in interviews. Interview questions will be guided by the initial survey results given to teachers. The district is also conducting surveys with students' caregivers about their experiences.

Overall, a combination of OTPD, online mentoring between colleagues, and administrators acting as ILs in the role of co-teacher within the LMS system was observed to be effective for rapidly implementing DL in the school in this study.

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APPENDIX A

Google Classroom Resources

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Distance Learning Training Survey

1. What worked well for you? Share personal stories. Especially any original lesson ideas that worked well and can be shared.
2. If we were to go into online learning again, what do you need to be able to deliver online learning effectively?
3. What resources were useful to you in preparing for Distance Learning or Online Instruction? Select all that apply.
    ○ Online Google Classroom training with administrators
    ○ Online Google Classroom training/resources from the District
    ○ Online Professional learning communities/professional development
    ○ Working with friend/colleague
    ○ Watching youtube videos
4. In the spirit of collaboration, would you be willing to let other teachers join your google classroom to get lesson/layout ideas? (yes/no)
5. Would you like to join other teachers' classrooms for the purpose of sharing lesson ideas? (yes/no)
6. Please list any resources you found and would like to share.
7. Please list any other concerns that you would like addressed, related or unrelated to DL.

Discovering the Affordances of Remote Instruction:
Implementation of a Cross-Disciplinary Collaboration Assignment Online

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Co-teaching is a promising practice to support the learning of all K-12 learners in inclusive environments but is infrequently implemented in schools, in part, due to lack of teacher preparation to collaborate and co-plan lessons. This chapter describes a cross-disciplinary collaborative assignment across classes in special and secondary education teacher preparation programs, which had to suddenly move online due to a shelter-in-place order mid-semester. The assignment was ultimately successfully implemented. The limitations and affordances of remote instruction for cross-disciplinary collaboration are discussed.

Keywords: co-teaching, collaboration, cross-disciplinary, teacher education, group project, special education, secondary education

INTRODUCTION

Co-teaching between general and special education (SE) teachers is a promising means for supporting all K-12 students in inclusive classrooms (Bacharach, Heck, & Dahlberg, 2008; Solis, Swanson, Vaughn, & McCulley, 2012). Successful co-teaching requires co-planning, co-teaching, and co-assessing (Murawski & Lochner, 2011), and teacher candidates need the opportunity to practice all three components before they enter the field. Few teacher preparation programs, however, explicitly address cross-disciplinary collaboration in coursework (Harvey, Yssel, Bauserman, & Merbler, 2010). Logistical and bureaucratic barriers often prohibit the development of the types of interdisciplinary projects that allow teacher candidates to develop and practice collaborative skills with their future colleagues.

For this reason, we were delighted to find that our Spring 2020 classes happened to be scheduled at the same time and in the same hallway, so we jumped at the opportunity to plan a cross-curricular experience for candidates enrolled in SE and single-subject (SS) credentialing programs. In the project, candidates would co-plan a lesson addressing grade-level content standards incorporating accommodations and instruction for students receiving special education services. The week the project was to begin, however, a shelter-in-place order required courses be moved online. As we moved the collaborative experience online, we identified strategies for remote instruction that circumvented some of the challenges associated with implementing cross-disciplinary class projects.

INNOVATION

The first challenge we faced was how to bring three professors, 24 SE, and 39 SS candidates together online, a task not well-suited for the learning management system (LMS) used by our campus. Here, we recognized the utility of *practice* course shells, which are provided so faculty can practice using embedded tools or design learning experiences to be imported to their live courses. It is also possible to invite students and other faculty to join the shell, allowing us to reconceptualize the practice shell as an additional learning space in which to bring students together across courses.

Table 1

Planning for collaborative activities online

Project Phase	Organization	Description
Phase 1 Building Background	Synchronous – all three classes together using break-out groups	Introduce project and groups. Groups complete semi-structured discussions. Faculty moderate groups.
Phase 2 Planning	Asynchronous – subject-area groups with two SE candidates meet to develop a lesson plan	Video overview of lesson plan template provided. Groups had to assign tasks to group members and coordinate their efforts to create a lesson that addressed learning objectives while implementing specially designed instruction and accommodations for a student with an IEP. Faculty mentored specific groups.
Phase 3 Reflection	Asynchronous – in individual classes	Each faculty member developed a reflection tool to connect the collaboration project to the content of the individual courses.

The second challenge was to identify which activities required synchronous work, which could be completed asynchronously, and which should remain as part of the individual courses. We used the ADDIE Model to *analyze* the learning objectives and learner needs, *design* the learning experience, *develop* the activities, and *implement* and *evaluate* the assignment (Shelton & Saltsman, 2008). We opted to organize the assignment into three phases based on the learning objectives in each phase (Table 1). In the *Building Background* phase, we introduced the assignment before assigning students to subject-area breakout rooms to engage in a structured discussion. We chose to meet synchronously using the LMS's embedded web-conferencing tools during this phase as we anticipated students would have a number of questions and because meeting synchronously would allow us to facilitate community building (Hrastinski, 2008).

To maximize flexibility in the *Planning* phase, we allowed groups to meet with one another asynchronously to co-plan a lesson. To facilitate cooperative learning, we provided a video overview describing and modeling the intended output (a brief lesson plan; see Appendix) and described the roles candidates should take in the planning process (Jeong & Hmelo-Silver, 2016). Despite these efforts, students sent a barrage of emails to the faculty, defaulting to reaching out to the instructor of their class session, which resulted in quite a bit of behind-the-scenes work to ensure we coordinated our responses. The solution was to assign an instructor mentor who would checking in with individual groups, meeting online, and providing feedback on drafts.

The lesson plans were graded for completion, with the groups revising their lesson plans until the learning objectives and the specially designed instruction for students with IEP aligned to encourage higher-order thinking skills. In the *Reflection* phase, students completed reflection activities tailored to each class, allowing differentiation in scoring while connecting the group project to each class's goals. The instructors also reflected on the experiences of the work, determining what worked and what needed improvement to recreate the experience in future collaborations.

RESULTS

Informal feedback suggested that the teacher candidates appreciated the opportunity to practice interdisciplinary collaboration. Comments on the reflection assignment suggested students would appreciate more such opportunities throughout their programs. Additionally, we noted that the quality of the lessons also improved. Early lesson plan drafts consistently demonstrated a lack of alignment between content standards, IEP goals, instruction, and assessment strategies, a common challenge with co-taught lessons in the field (Bryant Davis, Dieker, Pearl, & Kirkpatrick, 2012). These

weaknesses appeared to be related, in part, to challenges with group work including individual students dominating the collaboration. Working with each group to revise their lesson plans allowed the faculty mentor to unearth problematic assumptions about instruction and students with disabilities. The final lesson plans better addressed the learning needs of all students.

Teacher candidates also reported environment-specific (online) challenges. For example, connectivity issues resulted in students being kicked out of their groups during the *Building Background* phase. Some students reported ongoing connectivity issues that influenced their ability to participate in web-conferencing on their final reflections. Three of the groups reported challenges connecting with colleagues, either due to confusion about who was in each group, because a student used a different email address, or because students dropped from the course. Despite these challenges, some groups were able to innovate. For example, four of the ten final groups discovered that our LMS provided each group a mini-LMS platform with conferencing, announcements, discussions, and document sharing capabilities. These students primarily used this space to share ideas and meet. Many candidates ultimately reported they had developed strategies to collaborate outside of face-to-face meetings through this experience, which will hopefully serve them well as they enter the field.

IMPLICATIONS

This project adds to the literature base suggesting interdisciplinary pre-service preparation supports general and special education teachers' development of co-teaching ability (Shin, Lee, & McKenna, 2016). Furthermore, such collaboration is both possible and practical using tools available to most faculty in higher education, regardless of whether you are in a face-to-face or remote instruction environment. While our collaboration emerged due to the realization of the fortuitous scheduling of our courses, this experience has helped us realize methods of circumventing perceived barriers to such partnerships in the face of bureaucratic hurdles. Faculty seeking to develop similar experiences may consider how the strategies we developed could work for them.

One outcome that became clear as we moved through the assignment was that the typical challenges associated with group work were compounded by the online environment. As Jeong and Hmelo-Silver (2016) highlight, it is important to consider the affordances and constraints of computer-supported collaborative learning. In particular, it is important to recognize that students need more explicit guidance and opportunities to ask questions or meet with faculty for asynchronous work. While we opted to maximize flexibility by allowing groups to meet asynchronously, the lack of extensive team-building opportunities along with our inability to monitor the group dynamics resulted in some group dysfunction. The faculty mentor role introduced a mode by which we could monitor and regulate group interactions (Jeong & Hmelo-Silver, 2016) and was essential for the project's success.

Unsurprisingly, we experienced a number of challenges with technology as we made this transition mid-semester. For example, we had originally planned for 11 groups during our synchronous class session only to find (in the middle of the synchronous session) that we had access to eight breakout rooms. We also needed to adjust the way announcements went out to the combined class and individual groups. While we recommend testing each tool as much as possible before taking it to students, we also want to highlight the value of demonstrating pedagogical use of technologies with students, including what "went wrong," in order to deepen students' technological pedagogical content knowledge (TPACK) for teaching online (Koehler & Mishra, 2009). Our candidates' patience and understanding encouraged us to be more open about the challenges we faced, turning these challenges in to teachable moments. Ultimately, both candidates and professors learned a to use online instruction to collaborate. With the maneuvers we have described, we were even able to model the use of co-teaching via online instruction (Table 2).

Table 2
Co-teaching in planning the online instruction

Co-Teaching Element	Online Experience
Co-Planning	Faculty met virtually to plan instruction, including creating a lesson plan template and grading standards.
One Teach, One Observe/Assist	During synchronous sessions, professors balanced roles, with one professor presenting material at a time while the two observed the chat and answered questions.
Parallel Teaching	The mentor role and regular communication ensured that the same guidance, information, and support was provided to each group.
Station Teaching	Monitoring the breakout and asynchronous group work ensured specialized, just-in-time support.
Co-Assessing and Co-Reflecting	Collaborative review of and reflection on draft and final lesson plans via conferencing guided planning and instruction.

Finally, to ensure faculty are able to deliver interdisciplinary instruction, programs must develop a culture that values knowledge sharing and collaboration and is open to change (Fullwood & Rowley, 2017). Our professional trust allowed us to innovate as we experienced challenges with this project. It goes without saying that leadership also needs to provide faculty time to engage in collaborative planning, teaching, assessing, and modifying coursework. Faculty, meanwhile, need to be sure they have the time to embark on this journey and be prepared to flex and learn through the process while maintaining a shared vision of the importance of teacher collaboration.

FUTURE RESEARCH

There is scant research on the impact of instruction on co-planning on teacher's ability to collaborate and co-teach as they enter the field. Future research should include efforts to identify the impact of interdisciplinary projects on teacher candidates' self-efficacy for co-teaching and collaboration. Additionally, a direct comparison of the impact of face-to-face versus technology-enabled collaborations would provide further guidance to faculty seeking to develop similar projects in their teacher preparation programs. Meanwhile, faculty should thoughtfully consider the affordances of different technologies to support interdisciplinary collaborations.

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APPENDIX

Collaborative Lesson Plan (sketch)

The longer you teach, the more likely it is that you will teach and collaborate around a broad range of topics in various content areas. The objectives of this assignment are as follows:

Content:
We will be able to:
- Create a lesson plan (sketch) specifically to address accommodations and supports for a student with specialized needs.
- Analyze ideas and resources with a critical lens.
- Focus on collaborative lesson planning as a complex, human-centered, social-emotional and cultural process.
    o Addresses teaching performance expectations (TPEs) 1-6 for both single-subject and education specialists.

Language:
We will be able to:
- Exchange information and ideas and interact with others through oral and/or written online collaborative discussions.

- Offer and justify opinions, ideas, and resources to create consensus with others in a collegial, professional conversation (online synchronous or asynchronous)

- Adapt, edit, and revise language in a lesson plan (sketch) to maximize clarity and usefulness.

    o *ELD Standards Grade 11-12: A 1-4; B 5, 7; C 10, 12*

Step 1: Asynchronous OR synchronous
- *Choose **one lesson plan** presented by an EDTE 246 candidate and an "F2 student" (student with IEP) from a different EDTE candidate. You will use the description and knowledge of the FS2 to tailor the lesson to their strengths, interests, and needs.*
- *Set up a collaborative document using the attached lesson plan (sketch) template. Be sure everyone is invited!*
- *Determine who will research and bring 2-3 ideas/options for each section of the lesson plan.*
- *Schedule a time and platform to collaborate. This will set a deadline for each person to collect and organize their input!*
    o *The conference room in Canvas will be open with 8 breakout rooms*
        ▪ *Wednesday March 25 3-7*
        ▪ *Thursday, March 26 from 3-7,*
        ▪ *By arrangement anytime (7:30am-7:30pm) during Spring Break (contact Lara)*

Lesson Plan Selection Guidance:
- *Needs to be chosen by consensus. Can be a:*
    a. *Lesson someone has taught and wants to make more accessible for the next time they teach it.*
    b. *Lesson in the process of being planned.*
    c. *Lesson from methods class that they want to work on developing.*
    d. *New lesson, either inspired creatively or from an internet source as a starting point.*

*The lesson plan should be planned collaboratively. **Each member will take stewardship of a section of the plan.** As described below, there are more stewardship positions than members of most groups. Each member only needs to take on stewardship of ONE section.*
- *Each steward will bring two to three ideas/resources for your piece to a collaborative conversation.*
- *Each steward guides the conversation about their section with the aim of consensus.*

The stewardship sections include:

Single subject credential students:
- Content lesson objectives and assessment
- Academic language objectives and assessment
- Teacher monitoring of learning
- STUDENT Higher order thinking skills (HOTS)

Special education credential students:
- Specially designed instruction for students with disabilities, including accommodations – for instruction
- Assessment for students with disabilities (accommodations for assessment and assessment of goals)

Either single subject or special education credential students:
- Student self-assessment of content and/or IEP goals

Step 2: Synchronous Collaborative Meeting
- *Meet virtually using Zoom, telephone, or Big Blue Button Conferences (email professor to set this up if you need help/access).*
- *Collaboratively set conversation norms and goals in order to complete a draft using the attached lesson plan (sketch) collaboratively. Example norms may include:*
  - *Listen to understand*
  - *Share the space and*
  - *Be flexible: the goal of the conversation is to create a lesson plan (sketch) on which ALL of the group agrees.*
- *Assign roles and responsibilities for the conversation. Who will ensure all voices are heard? Who will keep the group on track? Who will summarize periodically? Who will ask "critical friends" questions in a gentle way?*

Step 3: Asynchronous or synchronous - Edit the draft!
- *Spell check*
- *Ensure there is "flow" to the document*
- *Ensure that the final plan includes ALL the sections, clearly communicated*
- *Ensure the plan works as a cohesive lesson (e.g., the objectives must align with the SDI which aligns with assessment, etc.).*

Lesson Plan (Sketch) Template

Subject Area:	Grade Level:	Content Standard(s):	ELD Standard(s):
IEP Goals and Accommodations (as known or observed):	*IEP or social-emotional Objective(s):*	Content Lesson Objective(s):	Academic Language Lesson Objective(s):
Materials:	*Assessment of IEP or SEL objective(s):*	Content Assessment (Formal/Summative): *if applicable*	Academic Language Assessment (Formal/Summative): *if applicable*
Online Learning Considerations AND/OR assistive technology (if applicable):	Student Self-Assessment of progress on IEP goals *(if applicable):*	Student Self-Assessment of content *(if applicable):*	Student Self-Assessment: of academic language development *(if applicable):*

Lesson Area & Time Allotted	Teacher does…	Students do…	Specially Designed Instruction (SDI) for Students with Disabilities (Accommodations)	Teacher Monitoring of Student Learning and SDI
Opening/ Anticipatory Set/ Building Background Time: ____minutes				
Main Body of Lesson *Must include active higher order thinking skills/activities for students* Time: ____ minutes				
Closing / Assessment of learning in the lesson Time: ____ minutes				

Prioritizing Relationships and Supportive Infrastructure in a University-School Collaboration Through and Beyond COVID-19

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Since 2017, Virginia Tech Partnering with Educators and Engineers in Rural Schools (VT PEERS) has collaborated with school educators and industry experts in students' local communities to collectively develop and facilitate curriculum with hands-on engineering activities to meet teacher-identified science standards alongside ongoing professional development. Through and beyond this pandemic, the collaborative, high-contact, and inquiry-based nature of our work cannot continue in the same way. Guided by literature on collaboration and effective teacher professional development, our priorities focus on authentic listening while also building infrastructure to scaffold ongoing partnerships. From early results, it is clear that schools and teachers are navigating the current environment in vastly different ways and with an equally wide range of most pressing concerns and needs. Our sharable strategies include examples for (1) getting creative, (2) not fully reinventing the wheel, while affirming that (3) above all else, we must focus on people and relationships first.

INTRODUCTION

Collaboration literature describes the inherent tension that individuals typically feel as they balance organizational demands with demands of collaboration (Thomson, Perry, & Miller, 2007) and that there are an array of contextual factors which might amplify or mitigate the effects of these competing pulls (Gillen et al., 2020). The day-to-day demands within the current COVID-19 pandemic are even more challenging; people and institutions naturally turn inward, to triage among competing pressures and to attend to only those family and work needs that seem most urgent. If and how university-school partnerships might sustain now and post-pandemic is an ongoing concern.

The PEERS project, a university-school partnership, currently involves 22 6th-8th grade science teachers from seven schools across three rural counties and their over 1900 middle-school students. This project strives to continue engaging teachers in our partnership while providing opportunities for teacher growth and development, an element crucial for furthering engineering activities in schools (Brophy, Klein, Portsmore, & Rogers, 2008; Nadelson et al., 2013). Our innovation and resulting implications are grounded in both the collaboration and teacher professional development literature, including the Interconnected Model of Teacher Growth (IMTG) (Clarke & Hollingsworth, 2002) and Desimone's (2009) critical features framework of effective teacher professional development.

INNOVATION

Both during crisis response mode and after, connection and community work are vital to resilience (Norris & Stevens 2007). As facilitators of the collaboration, our immediate priority is to genuinely connect with and support our teachers and industry partners while also building infrastructure that can facilitate a path forward for our important work together as the immediate demands of the crisis ease. Our fundamental goal remains to build capacity within schools and with regional industry partners to sustainably invest in the lives and educational futures of rural youth (see Grohs et al., 2020 for thorough program description). To accomplish this, we employ two overarching strategies.

Listen First, Often, and Authentically

Relying on the connections we've built with partners over the past 2.5 years, we have reiterated our commitment to teachers by inviting them to share immediate concerns and needs, while also offering our material support or expertise. Since the beginning of the pandemic and associated national and Commonwealth of Virginia orders, we have sought additional input and are evaluating how best to continue to provide professional development opportunities that bring our teachers together to build community and adapt to changing governmental policies around instruction for the upcoming academic year. We are acting on what we hear not what we think our partners need.

Scaffold a Path Forward for Future Collaboration

Research indicates that barriers to teachers implementing integrated STEM lessons include lack of time to learn about and design the content and lack of expertise (Chai, 2018). With this in mind, and in the spirit of continuing to invest in and maintain the momentum of our collaborative work, one critical short-term goal has been an accelerated effort to curate and widely share the PEERS curriculum so that teachers might better adapt and build upon it virtually. To accomplish this, lessons were made available via the free, open-access platform Google Workbench (https://edu.workbencheducation.com/). Workbench enables us to condense the lessons into adaptable, discrete steps with embedded pictures, videos and attachments. This format allows everyone, but specifically our teachers, to access and adapt the lessons. Lessons are aligned with state-specific learning standards, ensuring that these resources are relevant and applicable for teachers (Cohen, 1990; Desimone, 2009). There is potential to share Workbench lessons with students at home via Google Classroom and there is evidence that integrative STEM lessons like these reap great benefits for both teachers and students (Sanders, 2009; Burke, Reed & Wells, 2014). The VT PEERS Workbench channel and channels for other educational groups are linked below:

- Our VT PEERS Workbench channel with 10 lessons (https://edu.workbencheducation.com/partners/vtpeers)
- Other educational groups produce content on Workbench (e.g., the Computer Science Teachers Association https://edu.workbencheducation.com/partners/csta)

Additionally, we have launched a small grants program for teachers so that they might creatively develop and deliver lessons, continue working together, and seek additional training as needed. Understanding the individualized process of teacher growth, VT PEERS is providing teachers a customized and individualized path for their growth and development based on their current knowledge and beliefs (Clarke & Hollingsworth, 2002; Desimone, 2009; Guskey, 1994; Fishman & Krajcik, 2003). Individualized grant funds can support teacher time via stipends, provide classroom materials, and support professional development goals with ongoing support from the PEERS team during the development and implementation of the proposals. We will encourage and support partners to share lessons learned during the process with each other, within their schools, and with colleagues in other districts. The call for proposals can be found in Appendix A and the associated scoring rubric in Appendix B.

RESULTS

The constraints of long-term social distancing have stripped teachers of cherished face-to-face engagement with their students and forced an abrupt shift to various methods of at-home learning. Teachers report wide variation in student engagement in online learning and given the rural context, internet access is a persistent issue for some students and teachers. In addition to juggling student academic, nutritional, and safety needs, our partners share they are also responding to shifting state and federal guidance. While this is not surprising, it is important to recognize that there is nothing easy about teaching or learning amid a pandemic, and that systemic barriers which already differentially impact certain students are further exacerbated now.

Our approach, based on listening to teachers, was to ensure our activities are accessible online and to work with and support teachers via our flexible grants program to develop or change activities to fit with new, COVID-19 influenced conditions. We expect submissions to range from individual professional development requests to grade-wide team support for curriculum enhancement.

IMPLICATIONS

Our approach is situated within the context of a university-school collaboration where in-service professional development is built into the project. Because it is a collaborative project, we (the university partners) are not positioned to be directly on the front line of the immediate needs of our teachers and thus our approach may not be directly applicable to pre-service teacher education, for example. However, we believe strategies of listening and scaffolding future collaboration are transferable, and that it is critical we affirm that the trauma of pandemic exacerbates issues of access and significantly impacts both teachers and students.

From our listening and collaborative planning, and in the spirit of highlighting specific approaches which can inform university engagement with educational partners more broadly, we recommend the following:

1. *Get creative:* Higgins & Morgan (2000) claim "Creative thinking is a key capability the helps individuals and organizations deal with and manage change" (p. 117). It is not easy, but key learning outcomes and priorities from in-classroom lessons can be adapted to virtual or hybrid programming with creative, thoughtful modifications and accommodations. Teachers are masters of chaos and are resilient in adapting to sudden change. Supporting them can look like our small grants program funding time, training, and materials for their adaptive creativity (e.g., as principals might do in "Supporter" role from Bredeson, 2000) or thinking outside the box about partners in the community who might be able to help. For example, one of our industry partners who usually helps in classrooms has chemists currently furloughed who have interest in donating time to create short videos spotlighting water testing in their facility to advance important learning outcomes for students around human and environmental impacts on water supplies.

2. *Don't reinvent the wheel*: There are many stressors and demands on time, so while creativity is needed, teaching in this environment still involves juggling priorities and triage. Resources such as small grants and community collaboration will not fundamentally address systemic issues and it is important to set achievable goals and leverage existing resources whenever possible (Zellers, Howard, & Barcic, 2008). In our case, we commit to support modifying problem-based learning approaches from the past several years of our partnership that can now be offered in virtual or hybrid systems to ensure those opportunities are not lost to didactic, one size fits all delivery. Our efforts to compile lessons in Google Workbench has been a response to this and Workbench serves as one of countless hubs for quick turnaround lessons and activities available online that could enhance what at-home materials teachers are compiling.

3. *Focus on people and relationships first*: By listening carefully and continuing to scaffold engagement opportunities with and between partners, which has shown to improve teacher outcomes in professional development settings, we hope to grow the community of practice we have built within and across school systems, industry, and university partners (Kleickmann et al., 2016). Recognizing the unique constraints the pandemic places on different partners, and relying heavily on the relationship and trust built over the past 30 months has been vital for continued collaboration and aligns with literature (e.g., Tschannen Moran, 2001). This applies also to relationship building with students. Many teachers have noted that without the initial semester of in person relationship building with their students, they could not imagine how they could have delivered curriculum and support this past spring. Though it seems like common sense, it is important that we all remember that every individual personally and professionally within their organization is faced with competing demands and has different needs.

FUTURE RESEARCH

Under these new circumstances and continuous adjustments made to our collaborative efforts, it is crucial that we continue researching educators' needs in this time as well as the effectiveness of our approaches. In the spirit of continuous improvement, future research efforts may include:

- Assessing community capacity for continued regular partnership between regional industry partners and school educators given changing environments for educators (e.g., hybrid or virtual models) and industry (e.g., economic hardships impacting workforce)
- Exploring how university resources (e.g., time, expertise, small grants) might continue to facilitate multi-stakeholder partnership between schools, industry, and higher education
- Evaluating the usefulness of Google Workbench, beginning with metrics such as unique views/downloads but extending later into feedback via surveys or focus groups

- Investigating teacher perceptions of the effectiveness of the shifts in professional development throughout the pandemic response
- Studying how middle and high school students' knowledge and perceptions of career opportunities and future educational and career plans are influenced by the pandemic's impacts on the workforce.

Acknowledgements

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Engineering grants for teachers

Engineering Grants for Teachers

Purpose: To help you continue building a culture of engineering thinking in your classroom once the VT PEERS project ends. Because stay-at-home measures meant an abrupt change to our VT PEERS programming during the 2019-2020 academic year, we are reallocating funds to these grants.

Scope: How will you continue to incorporate engineering activities into your teaching or school culture? We are looking to fund projects that (1) forge engineering connections in your local communities, (2) incorporate the VT PEERS Things to Know about Engineering (TTK) into learning, and (3) intentionally connect to local and youth experiences (cultural relevance). We are looking for projects that creatively reach students who might not otherwise be encouraged to pursue engineering experiences. This funding could be used to support you in transitioning curriculum to a distance learning format.

Funding: Awards are for the 2020-2021 school year and will support individual teachers or teams of teachers who demonstrate a detailed plan for continuing engineering thinking in their classrooms and schools. Grants will be made in a range from $500 to $1500, depending on individual or team submissions and project budgets.

Eligibility: Applicants should be teachers who have already been participating in VT PEERS; however we welcome inclusion of other teachers as a part of a team, and cross-curricular projects are especially encouraged. Projects can be a continuation or expansion of VT PEERS activities, or they can be new material or activities in your school that meet the above objectives.

Examples of grant elements: (Please don't let these limit you; we offer them as a starting place.)
- Funding Time (like the stipend you've received in past years) so you can plan
    - Project Based or Inquiry Based Learning Unit - Cross curricular team comes together to develop a unit on climate change (or any other topic) with an engineering lens. Potential to involve industry partners.
    - Department works together to include engineering in the curriculum - Science teachers from across grade levels collaborate to write unit materials on how to include the TTK in science lessons and/or creative problem solving approaches including the scientific method and the engineering design process.
    - Engineering Career Assembly or other schoolwide engineering event planning.
    - Develop strategies for including the TTK and engineering thinking into your distance learning plan. What supplies might be involved? This may be a helpful starting place:
        - Why the Engineering Design Process is More Important than Ever from DiscoverE

- Professional Development and/or travel possibilities
  - Attend and present your work at Virginia Children's Engineering Conference, Virginia Middle School Association Conference, or another national conference
  - On-line training opportunities
  - Industry visits

- Supplies you might consider
  - Coding robots, Snap Circuits, 3D Printer, Lego/reusable building materials, etc.
  - STEAM closet/Maker Space supplies
  - Specific supplies for a new unit or supplemental supplies for projects being integrated or expanded.

Timeline:
- Applications will be reviewed on a rolling basis beginning summer 2020 and throughout the 2020-21 school year.
- Applicants notified of award or denial within two weeks of submission.
- All funded activity must be completed during the 2020-21.
- Final report and/or materials submitted no later than May 15, 2021.

Required Application Materials: All elements of the application will be submitted here. Sections of this application include:
1. Project Type and Applicant Information
2. Project Description and Purpose with student outcomes and educator growth
3. Community Outreach Plan
4. Planned Use of Funds with an itemized budget
5. Letter of Support (one page, pdf) from your Administrator (Superintendent, Principal or Assistant Principal)
6. Awardee Agreements (to use money to support the project; to complete final report; to share project artifacts with VT PEERS Team)

Review Process: Applications will be reviewed as they are submitted. A rubric will guide the process.

VT PEERS Things to Know (TTK) about Engineering and Engineers
1. Engineering is in every community and makes a difference in people's lives.
2. Everyone can learn to do engineering.
3. Engineers are creative, curious, and imaginative.
4. Engineers work with many types of people to understand problems and create solutions.
5. Engineers rely on knowledge from multiple subjects to understand all they can.
6. Solving engineering design problems requires compromise and trade-offs.
7. Engineers view mistakes as normal and important and try to learn from them.

Appendix B

Rubric engineering grants for teachers

Engineering Grants for Teachers Rubric

Use the table below to indicate how strong each aspect of an application is, and then total the points for each submission. This rubric is designed to support competitive proposals and our team is ready to work with teachers to develop successful applications.

The grant's purpose is to help teachers continue building a culture of engineering thinking in their classrooms and schools once the VT PEERS project ends. We are looking to fund projects that (1) forge engineering connections in local communities, (2) incorporate the VT PEERS Things to Know about Engineering (TTK) into learning, and (3) intentionally connect to local and youth experiences (cultural relevance).

Application ID#_____

Question/topic	Quality of Project/Activity				
	Very low (1)	Low (2)	Moderate (3)	Fairly high (4)	Very high (5)
Quality 1. Depth of community outreach plan					
Quality 2. Incorporates TTK					
Quality 3. Considers cultural relevance					
Quality 4. Clarity of proposed activity(ies)					
Quality 5. Clarity and alignment of budget with purpose					
Quality 6. Doability in the given timeframe					
	Anticipated Outcomes				
	Very low (1)	Low (2)	Moderate (3)	Fairly high (4)	Very high (5)
Overall 1. Impact on Professional Development					
Overall 2. Impact on School/Classroom Culture					
Overall 3. Impact on Community Engagement					
	Your Overall Assessment of the Project (Including and Beyond the Above Factors)				
	Very low (2)	Low (4)	Moderate (6)	Fairly high (8)	Very high (10)
Overall 1. Your overall estimate of the value of this project					

Total Points = _____ / 55

Reviewer name: _____

Application recommended for (Circle one):   Full Award   Partial Award   Revision

Please include comments specific to each application on the back of this sheet.

Promoting the Home-School Connection During Crisis Teaching

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In the school closure for COVID-19, Farmersville ISD, a small rural K-12 district in Northeast Texas, had to deal with a 70% Internet connectivity rate for its students. Although the entire district utilized a hybrid approach, using both paper packets of work and various tools for online learning, the second-grade team chose to use Class Dojo and Zoom for its web-based component. Their focus on using a familiar technology platform and daily content based on the lower levels of Maslow's hierarchy of need allowed teachers to build a strong home-school connection and provide students with emotional comfort and some sense of normalcy.

Keywords: communication, home-school connection, Class Dojo, Zoom, social-emotional needs, rural, community-building, Maslow

INTRODUCTION

The COVID-19 pandemic restructured how teachers delivered instruction to their students. "Teaching moved from offline to online, teachers moved from classroom face-to-face teaching to online cloud teaching, and student learning moved from classroom listening to home study" (Kong, 2020, p. 558). With little time and without training, many teachers were forced to create a remote learning environment using a myriad of unfamiliar technology tools. Teachers reported that adapting to an online learning environment was stressful and taxing (Kong, 2020).

At minimum, teaching and learning online requires access to the Internet and a computer or mobile device. In preparation for school closure, the staff of Farmersville Independent School District (FISD) contacted the family of each student to determine Internet connectivity and availability of devices for internet access. As a small, rural Texas school district, it was generally well-known that there were families without Internet access, although this was the first family-by-family survey of technology. There were approximately 30% of students in FISD with no consistent Internet access, therefore, the district utilized a combination of online instruction and paper packets of work.

INNOVATION

At Farmersville Intermediate School, the second-grade team consisted of six teachers and approximately 130 students. Although some families did not have Internet connectivity, almost all parents were connected with Class Dojo via smartphone for general class announcements and communications. According to Williamson (2017), "ClassDojo is a free mobile app that allows teachers to award 'positive behavior' points for individual children's behavior and participation in the classroom" (p. 440). The ClassDojo app also enables teachers and parents to send messages, video, pictures, and documents to each other. In addition, a two-way translation feature allows teachers and parents to communicate with one other in their own language.

Because ClassDojo was used regularly prior to the school closure, it was decided that teachers would continue using it to communicate with parents and students during the pandemic. The features of the platform were compatible with distributing instruction as well. Teachers were able to send instructional video to the families, as well as PDF documents and images of worksheets and other assignments. The familiarity of this app helped alleviate some frustrations associ-

ated with the transition to remote learning. This use of existing technology followed the suggestion of the Texas Computer Education Association (TCEA) who recommended that, in the instance of emergency remote teaching, teachers and school districts use already-introduced platforms as much as possible (Mguhlin, 2020).

The teachers also instituted optional video class meetings using Zoom. For student safety and privacy, the Zoom links were shared through Class Dojo. The Zoom meetings were scheduled based on each teacher's home and family situation. These 45-60 minute sessions were an opportunity for students to ask questions about schoolwork, if needed, but the time was often spent with low-impact, generalized lessons. Lessons covered a variety of topics targeting social-emotional health and listening skills. To promote a sense of structure, a weekly schedule was followed:

- Mojo Monday - Class Dojo movie on Social-Emotional Health (Mojo is the character's name), follow by class discussion
- Tell a Joke Tuesday - students bring in and share their favorite jokes
- We Can Draw Wednesday – directional art activities from the Arts for Kids Hub YouTube channel
- Think Like Kid President Thursday – Kid President videos from the SoulPancake YouTube channel, followed by class discussion on positive character traits
- Show and Tell or Scavenger Hunt Friday

RESULTS

One teacher set up daily Zoom meetings. She reported that 16 of her 22 students attended the initial meeting, with numbers leveling off to 7-10 students in subsequent days. She explained that different students attended on different days, based on their home activities and situations. All meetings were optional. A session observed at random included students chatting with their teacher and with each other, but also spotlighted strong school-family connections. As one student sat at the kitchen table, their mother worked in the kitchen behind them. From time to time, the mother made comments and joked with the teacher. When an older brother of one student walked within view of the camera, he dipped his head into view and he and the teacher greeted each other.

In a difficult time, such as the pandemic-induced school closure, a strong sense of community and normalcy is needed. It has been found that "clear communication and collaboration between children, teachers and parents within accessible physical and online environments" (Hutchison, Paatsch, & Cloonan, 2020, p. 178) are vital for home-school connections. Teachers reported that the use of Class Dojo and Zoom helped foster a strong home-school partnership.

IMPLICATIONS

Home-school communication must be a priority, especially during an emergency situation or school closure. Before launching any emergency remote learning, teachers should be instructed to contact the families of each student to ask the following questions: (1) What internet connectivity do you have? (2) What devices are available for your student to get online? (3) Is anyone in the home currently sick? (4) Does the family need any assistance? Asking these questions will allow teachers to identify specific needs of their students and enable the district to utilize resources and focus on serving the community. The district should define the number of devices needed for check-out, if applicable, and refer families needing medical and emotional assistance to school or community resources. Continual two-way communication during an emergency school closure is vital; the school and community partnership enables all parties to work together to identify and meet the needs of the community.

Districts must address each student's physiological and safety needs, and then focus on academics. Teachers should be trained on Maslow's hierarchy of needs (Milheim, 2012) with a focus on understanding the human need for comfort and normalcy, especially in a crisis situation. During emergency teaching, educators must be cognizant of, and plan for, students' emotional needs. To foster a strong home-school connection and to provide academic and social-emotional support, teachers should conduct regularly scheduled video meetings. To this end, districts or campuses need to identify a video conferencing tool to be used as the standard throughout the organization. Educators should be trained in the use of the selected tool, and how to utilize it as both learner and teacher. Regular use of these tools within a district, before a school-closure situation, is important to help staff feel accustomed to its use.

Having a consistent line of communication is vital to the success of a school and makes the transition much easier if schools close. When teachers use the same communication platform, they can collaborate and share materials more efficiently. This will require campus-based decisions before the start of a school year, to select and implement a communication tool to be used by all teachers, along with the accompanying training on expectations of use. Implementing these requirements will streamline communication and provide consistency for parents and the school community.

During the 2020 pandemic, relying on familiar technology tools plus utilizing video conference options served as a solid foundation for supporting students and families during the enforced at-home learning situation. Allison Yang (2020) promoted these ideals in her *Do This, Not That* blog, when she advised teachers to allow for students to connect with each other, to communicate consistently, and to be available online to provide emotional and academic support. Districts and schools can plan ahead for future emergencies by identifying and implementing standardized communication expectations – thus minimizing the trauma of implementing emergency at-home learning.

FUTURE RESEARCH

Class Dojo provides a consistent, two-way communication platform that is accessible to most families. Non-English speakers can use the translation feature of the app to communicate with the school staff and vice versa. Based on its use by the second-grade team, the other teachers on this campus will adopt Class Dojo for the upcoming school year. The school's annual parent survey on school culture may provide data on the parent perceptions of strong communications, both before the use of Class Dojo, and after.

The current studies on ClassDojo focus on its behavior management program, as opposed to its communication aspects. Future research should focus on whether Class Dojo strengthens the home-school connection in different grade levels and different environments including rural, suburban, and urban, or on the effectiveness of distributing instruction via their app. In more general terms, additional research into the effective use of communication tools, and in the effective training of teachers on the use of such tools, is needed.

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Safe Texting:
Increased Accessibility, Support and Connection for Preservice and in-service Teachers

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Effective communication is listed as a best practice in higher education and can contribute to a preservice teacher's overall satisfaction during remote learning. Due to the ubiquitous use and pervasive acceptance of technology during online and blended learning, preservice teachers expect faculty to use technology in a variety of forms from instruction to communication. However, it's not about the technology tool as much as it is about how effectively the faculty uses it (Becerra, 2017). Faculty can use safe texting platforms in a multitude of ways to communicate with preservice teachers and in-service alumni including announcements, checking in and questions, encouragement, and student-to-student communication. Integrating text messaging provides faculty with an opportunity to communicate effectively with their preservice teachers and in-service alumni to increase accessibility, support and connection.

Keywords: safe texting, communication, accessibility

INTRODUCTION

Faculty can effectively communicate, support and connect with preservice teachers and in-service alumni through safe texting platforms during online and hybrid learning. Effective communication is listed as a best practice in higher education (Chickering & Ehrmann, 1996). This research seeks to demonstrate the importance of faculty communicating and engaging with preservice teachers and in-service alumni on their level by using the tools they use (Bowen, 2012). For almost a decade, texting has been ranked as the preferred method of communication (Gallup, 2014). On a daily basis, 68% of millennials indicate they send and/or receive text messages "a lot" (Pew Research Center, 2015). The theoretical framework for this work is guided by Garrison, Anderson, and Archer (2000)'s Community of Inquiry (CoI) specifically the social presences which focuses on communicating.

INNOVATION

Faculty can capitalize on preservice and in-service teacher preference to communicate by text message. Safe texting platforms like Remind, Bloomz, and Group.Me provide privacy protection for its user's personal cell numbers. Here are some ways faculty can integrate safe texting in any learning context:

Announcements: One-way announcements sent by a safe texting platform arrive immediately to user's cell phones "wherever they are and whatever they are doing" (Bowen, 2012). Announcements can be sent out by text message to preservice teachers and in-service alumni about upcoming lectures, events, cancelled class, new videos, assignments or readings. Preservice teachers are more likely to see the text message versus an email or LMS update (Bowen, 2012).
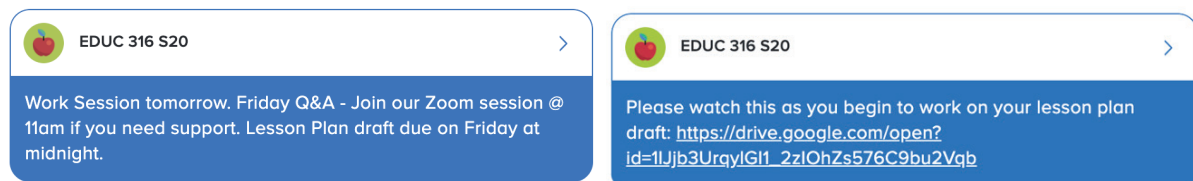
Figure 1. Example of announcements.

Encouragement: Many preservice and in-service teachers are stressed and seeking support. They are in desperate need of connection and encouragement (Rich, 2006). Faculty can send inspirational teaching quotes or encouragement on upcoming assignments.

Figure 2. Example of encouragement.

Checking In and Questions: It is important to develop and maintain a professional relationships with preservice teachers and in-service alumni. Preservice teachers place a high value on rapport with faculty (Buskist, Skiroski, Buckley, & Saville, 2002). Thoughtful checking in can build additional rapport and simultaneously provide an opportunity to ask questions (Lederman, 2020). Frequently preservice teachers have questions but do not feel comfortable voicing them (Thurner & Hammer, 2016). However, they are more likely to reach out for faculty support after they've made a personal connection (Kim & Sax, 2017). Safe texting platforms offer two-way private communication providing preservice and in-service teachers with an avenue to ask their questions.
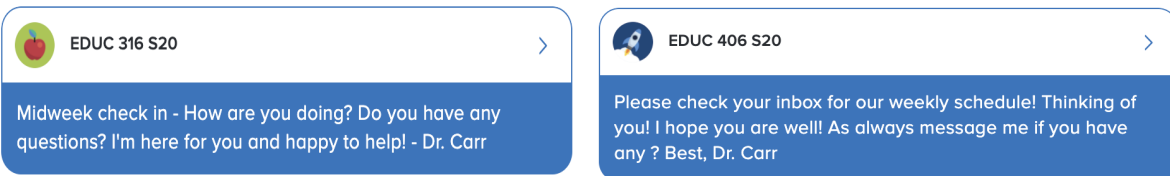
Figure 3. Example of checking in.

Student-to-Student Communication: Many safe texting platforms offer student-to-student or group messaging capability. Strong communication is necessary during group projects (Arkilick, Peker, Uyar, 2013). Safe texting platforms can provide quick communication which break down barriers that sometimes occur within an online or blended learning environment.

RESULTS

Safe texting has been a positive communication mechanism to engage with preservice teachers and in-service alumni during remote or blended learning. 100% of all preservice teachers enrolled in courses taught by the faculty researcher signed up for text messages. Confirming the Gallup 2014 poll that texting is the preferred method of communication. IRB approval has been obtained and a survey has been developed to investigate the impact of the faculty's communication via texting. Early results show 75% of preservice teachers report the texting was been helpful to them during remote learning. One student expressed, the text messages "*made me feel more connected to campus and events even though we weren't able to be on campus in person*". Another shared, "*I found the texts helpful as a quick form of commu-*

nication with you so I could ask about any questions/concerns. The texts were also always so positive and made me feel better. You were one of the few professors during the pandemic who constantly checked in on me."

Early results show 60% of in-service alumni report the communication through texting has been helpful to them during remote learning. An in-service alumni shared, "*Just having that little bit of positive encouragement was helpful, when I felt like I was struggling to keep my head above water when all this distance learning started*". Finally, another stated, "*Some days I felt super defeated but getting a message every Monday was nice. I often feel like I'm alone in the midst of my situation and your messages proved me wrong. Thank you*".

IMPLICATIONS

As faculty, we use communication methods we are comfortable with to stay connected to family and friends. Maybe now is the time for faculty to start using, texting, the communication tool preservice and in-service teachers are most comfortable with. There are many advantages to embracing new technologies that enhance communication such as increased accessibility, current information, care, support, connectedness, ease of use, and retention. (Sweeny, 2010).

Accessibility: According to Bowen (2012), "when connectivity increases, so does the expectation". Preservice and in-service teachers can access anything with the touch of a finger or a voice activated phrase, they are not used to waiting. During remote learning, college students want to be able to contact and receive a timely response from faculty (Lederman, 2020). Integrating safe texting increases accessibility to faculty by opening another avenue of communication.

Current Information: Text message announcements help provide preservice teachers with the most current information. College students receive dozens of emails a day - it can be difficult for them to weed through and find the important content (O'Hara, 2019). Thus, alternative methods of communication can be a more efficient and effective way to communicate with preservice teachers and in-service alumni (Bowen, 2012).

Care: In a recent study, text messages sent by faculty seemed to "increase students' sense of belonging or being 'cared for' and 'cared about'" (Boath, Jinks, Thomas, Thompson, Evans, O'Connell & Taylor, 2016, p. 84). When preservice teachers feel cared for by faculty, the results are significant including: higher academic performance, more confidence, investment, engagement, and on-task behavior (Kim & Lundberg, 2016; Making Caring Common Project, 2016; Meyers, 2009).

Support: Teaching is an emotional profession and teachers especially novice teachers need effective emotional support. A teacher's state of mind matters; "teaching has become so high stakes that many new teachers hit an "I'm not sure I can do this" wall earlier in the year than ever before" (Salinas-Oviedo, 2019). Sending encouraging text messages to preservice teachers and in-service alumni can provide an additional layer of support.

Staying Connected: Encouraging preservice teachers in-service alumni to sign up for text messages using their cell phone number provides an important connection to their institution. It is important for faculty to stay in touch with preservice teachers and in-service alumni during remote learning (Lederman, 2020).

Ease of use: A safe texting platform is similar to texting on a cell phone. So, faculty do not need to complete extensive training.

Retention: Some institutions have explored using texting to strengthen retention efforts by communicating deadlines for financial aid, registrations, or orientations. These text reminders are particularly useful for first generation college students (Adams, 2014).

FUTURE RESEARCH

Faculty can use safe texting during remote, blended or traditional learning within any academic department. Safe texting is easily modified based on faculty, preservice teachers, and in-service alumni needs. While texting is the pre-

ferred communication method for individuals under 50 years old, faculty will need to determine for themselves if implementing a safe texting platform is appropriate for them, their preservice teachers and in-service alumni. When implementing safe texting, it is recommended to encourage all preservice teachers to sign up. If not, the faculty may have to use additional communication methods such as email or LMS announcements to ensure all preservice teachers receive the information. The faculty researcher plans to continue to explore the impact of safe texting.

Safe texting can enhance a student's collegiate experience by increasing accessibility, support, and connection. A win for any faculty seeking innovative ways to communicate during remote, blended, or traditional learning (Boath et al, 2015; Bowen, 2012; Castleman & Page, 2015).

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Morning Meetings: A Responsive Model to Increase Teacher Candidates' Connectedness

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Due to the global COVID-19 pandemic, the world is very different. We are all social distancing, so finding ways to maintain human connections and some "normalcy" during this time of virtual interaction is vital to both teacher candidates' success and their social emotional health. Teacher candidates find themselves straddling the line between being both a teacher that is responsible for their P-12 students' learning and well-being and a student needing guidance and support to help maintain their own. Implementing the tenants of a traditional "morning" meeting, usually thought to be reserved for elementary classrooms, gives teacher candidates a safe place to process the shared trauma of the current education landscape while giving them a sense of stability.

INTRODUCTION

Our purpose as faculty members has shifted to helping teacher candidates navigate the challenges of these unprecedented times. Their social emotional health must be a priority so they, in turn, can support their P-12 students' needs. It's important to remember that now more than ever we must be humans first and professors second. To do this, faculty must establish trust and build caring relationships with teacher candidates. The theoretical framework for this study rests on Noddings' (2005) ethics of care in the classroom that argues care should be at the heart of the educational system.

Research shows that building caring relationships with students has many positive impacts, including academic achievement and intellectual growth and development (Astin, 1993; Carr, 2016; Kim & Lundberg, 2016; Kozanitis, Desbiens, & Chouinard, 2007; Meyers, 2009; Noddings, 2005; Pascarella & Terenzini, 2005). Morning meetings provide a consistent platform where candidates can share their distress (or success) with others experiencing the same thing. During this time of extreme flux, which can be overwhelming, it is important to be intentional with practices that can identify signs of trauma and not assume disengagement or apathy. In order for students to learn, they need to trust their teacher and have a positive and effective learning environment (Myers, 2009). Morning meetings can help establish that environment by building strong faculty-student relationships, demonstrating care, creating a positive classroom climate, and focusing first on social-emotional wellness (Kriete & Davis, 2014). From there, candidates can begin to focus on the professional practices and academic challenges to be addressed.

INNOVATION

In elementary schools across the nation, the school day starts with a morning meeting. These meetings are used as a way to connect with students and serve to ground them in a sense of belonging and security while helping them focus on the day (and learning) ahead (Kriete & Davis, 2014; Levine, 2003). Although they vary, the traditional morning meeting structure includes a greeting, sharing, and a community building activity. Through a modification of this sustained, ritualistic practice, faculty can co-construct online learning communities that focus on personal connections and ensure candidates' social emotional health is a priority. Personal connections can strengthen a student's engagement, and students are more likely to verbalize the help they need once they've made a connection (Kim & Lundberg, 2016; Strong, Silver, & Robinson 1995).

Process: A weekly morning meeting with teacher candidates was implemented following the move to distance learning. It followed a traditional structure (greeting, sharing, community building activity) and met synchronously in a virtual meeting platform (such as Google Meets or Zoom) and asynchronously. Meetings were held at the same time each week (at the start of class, not actually in the morning), and the same structure was followed for each meeting. Maintaining classroom rituals is comforting, and humans thrive on familiarity, especially during challenging times (Kriete & Davis 2014; Levine, 2003). During asynchronous meetings, elements were adapted or modified using various technologies, such as Flipgrid, Nearpod, Padlet, Remind, and Seesaw, all of which have varying video, audio, and text features. Below are some ways to implement this practice with very little preparation and few materials.

Greeting: Planning unique greetings engages candidates from the start, such as learning and practicing greetings in other languages (https://www.babbel.com/en/magazine/how-to-say-hello-in-10-different-languages), creating unique virtual handshakes, doing the "wave" (as done in stadiums), or starting a greeting "chain" in person or in the chat (I greet the first person, they greet another, and so on). If meeting asynchronously, greetings and greeting chains can be done using a safe, private texting platform, such as the Remind app.
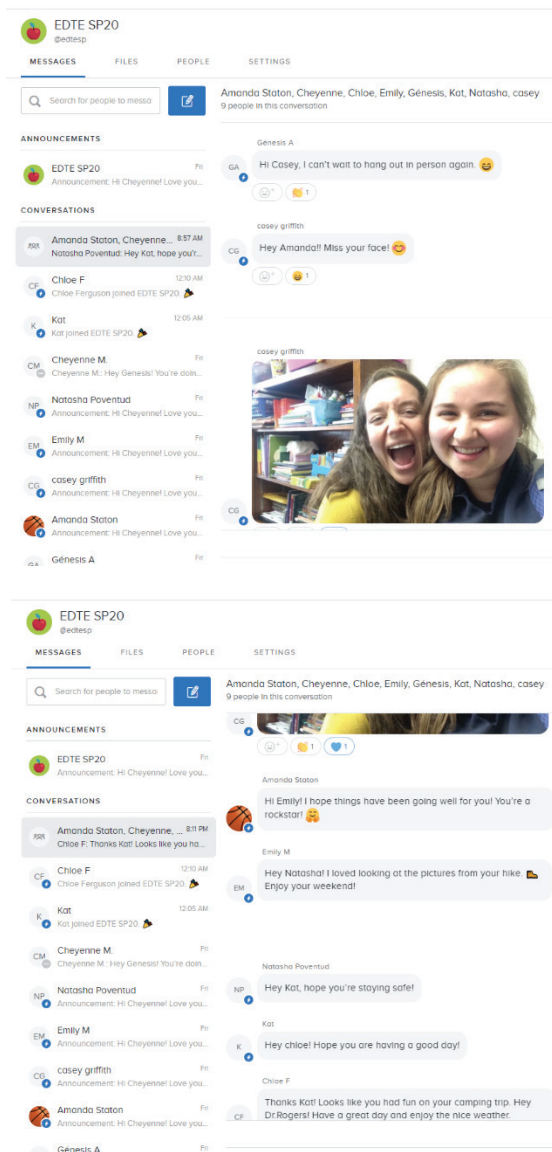
Figure 1. Example of a greeting chain using the Remind app.

Sharing: Sharing doesn't have to take a lot of time. Faculty can provide prompts, such as, "share a picture that made you smile (or you found difficult) today." Or, candidates can share an emoji in the chat that helps faculty take the temperature of the room or note individuals that may need to be contacted separately. Sharing can be done asynchronously by having candidates create a virtual bulletin board using a platform such as Pinup or Padlet. Some platforms, such as Pinup, have a group chat feature that allows students to interact with each other's boards.
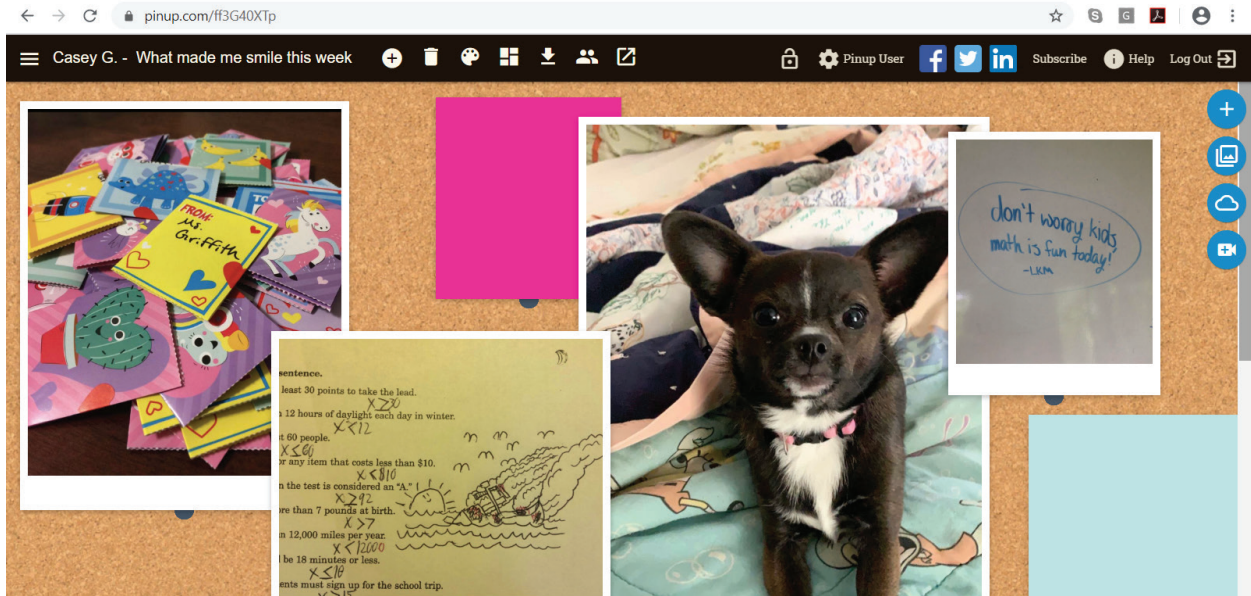
Figure 2. Example of a Pinup bulletin board for the prompt: What made me smile this week.

Activities: Building community through virtual activities is the most challenging -- but doable with some creativity! Lead the group in a few minutes of yoga or mindful breathing exercises. Share a riddle (https://www.ventureteambuilding. co.uk/brain-teasers_riddles/#.XtabNzpKg2x), make an estimation jar (how many M&Ms are there?), or create a quick scavenger hunt (for items in the home). This can be done individually or in a small group. For example, students find and bring back items (1 red item, 1 fluffy item, 1 loud item) to the virtual class. The first person (or team) to show all items, wins. When working in groups, students can plan and communicate in the chat or on a back channel, such as the Remind app. Activities, such as a scavenger hunt, can be completed asynchronously by creating and posting short videos on a class LMS using their phones or a platform like Flipgrid.

Figure 3. Examples of quick, fun breathing exercises from The Therapy Source.

Figure 4. Example of an estimation jar.

Faculty can further engage teacher candidates by encouraging them to lead the meeting or suggest ideas for the greeting, sharing, and community building activities.

RESULTS

At the end of the semester, a simple, informal survey was administered asking candidates 1) if they liked the practice of starting our weekly class sessions with a morning meeting and 2) if they felt it helped them feel connected to class. Initial feedback indicates a positive response to this practice: 100% of those participating said they liked having morning meetings, while 63% said it helped them feel connected to class. One MAT teacher candidate in Early Childhood Education commented, "The morning meetings were great and very decompressing but also informative about different strategies that we could use for various learners in our practice."

IMPLICATIONS

During this time, there is no doubt that teacher candidates and P-12 students have innumerable concerns (schoolwork, health, family responsibilities, displacement). However, faculty are in a position to support teacher candidates, and subsequently their students, through thoughtfully planned interactions focused on student connectedness, which can be vital to success during this difficult time when social distancing can make us feel disconnected. Implementing morning meetings can lead to improved faculty-student relationships, classroom climate, and social-emotional well-being, all of which can increase student engagement and achievement (Barr, 2016; Jones & Bouffard, 2012; Kriete & Davis, 2014; Levin, 2003; Sidelinger & Booth-Butterfield, 2010).

Faculty-student Relationships: Connecting in some way with each candidate is easy to do in person (through eye contact, a nod, a quick hello); however, it becomes a challenge (and, therefore, more important) in a virtual classroom. Research shows that the teacher is the single most important factor that impacts learning (National Commission on Teaching and America's Future, 1996). Making it a practice to intentionally greet each other lays the foundation for making sure everyone feels seen and heard. In addition, faculty should actively participate in the planned sharing during weekly meetings. Demonstrating interest and allowing students to get to know you as a person (and as an educator experiencing many of the same things) are vital components in fostering relationships (Myers, 2009; Noddings, 2005; Sanderse, 2012). The development of supportive faculty-student relationships in the classroom can significantly improve academic performance and increase student engagement (Astin, 1993; Carr, 2016; Kim & Lundberg, 2016; Kozanitis, Desbiens, Chouinard, & 2007; Meyers, 2009; Noddings, 2005; Pascarella & Terenzini, 2005).

Classroom Climate: Graham & Gisi (2000) found classroom climate was the best predictor of students' overall satisfaction with their educational experience. Two of the primary determinants of classroom climate are faculty-student relationships and interactions and student-student relationships and interactions (Barr, 2016; Sidelinger & Booth-Butterfield, 2010). Therefore, faculty should incorporate community building activities that are fun and require candidates to communicate and collaborate. Getting to know each other and working together helps build rapport and are key factors in building a positive classroom climate (Barr, 2016; Levine, 2003; Meyers, 2009). In addition, allowing students to suggest ideas or lead activities gives them ownership over their experience, which can also improve classroom climate (Brooks, 2004). Morning meetings provide faculty an opportunity to be pro-active in cultivating a safe space for regular interaction that is student-centered and relational.

Social-Emotional Well-Being: Cultivating effective communication is considered a best practice in higher education (Chickering & Ehrmann, 1996), and is more important than ever. Right now, candidates need a place to process what they (and P-12 students) are feeling and experiencing. Faculty should designate time to share at weekly meetings. Often candidates feel they are the only ones struggling or that they are failing if they find the new expectations for remote learning extremely difficult. Providing a platform to talk about the hard (or sad) things teacher candidates are going through (for example, helping to deliver meals to students in need or to pack up their empty classrooms, which were "frozen in time") with others who understand and are having similar experiences can aid in healing the shared trauma

(Niederhoffer & Pennebaker, 2002). Additionally, faculty should incorporate positive prompts for sharing that present opportunities to praise candidates or help them focus on the beneficial aspects of their experiences, such as learning new teaching strategies or more time to speak with students one-on-one (Carr, 2016; Dweck, 1999; Sieberer-Nagler, 2016). Attending to teacher candidates' social emotional well-being can directly impact their ability to do the same for their P-12 students. Children who have strong social and emotional skills perform better in school, have more positive relationships with peers and adults, and have more positive emotional adjustment and mental health (Jones & Bouffard, 2012). Morning meetings provide an opportunity for faculty to explicitly demonstrate care and create meaningful avenues of communication that allow candidates to express their needs and concerns while navigating the myriad changes they are encountering.

FUTURE RESEARCH

Faculty can implement this practice either synchronously or asynchronously in its typical format or a modified version to serve the needs of their particular teacher candidates. A more formal, in-depth survey tool could be created and administered in order to illicit detailed and concrete information about 1) what aspects of the morning meeting candidates liked and why; 2) if morning meetings made candidates feel cared for; 3) if morning meetings helped candidates in their practice with P-12 students and how; 4) if morning meetings improved the (virtual) classroom climate. Also, a research study could be implemented using a control group of teacher candidates enrolled in a course not implementing morning meetings for comparison.

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Creating a Community of Practice for Educators Forced to Transition to Remote Teaching

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In early spring 2020, a pandemic forced long-term school closures, resulting in school systems making an emergency transition to remote learning. Educators at all levels were left unprepared for this major pedagogical and psychological shift. This paper presents the use of community of practice theory to design and implement a Twitter chat for facilitating and supporting instructional transitions to remote learning under emergency conditions.

INTRODUCTION

The pandemic of 2020 necessitated world-wide school closures and transitions to remote learning for K-16 schools (Strauss, 2020). The evolving crisis resulted in unique pedagogical challenges, and required development of innovative instructional practices, as well as mechanisms for combating educator isolation. Faculty, students, and alumni from Towson University (TU) considered options for how to support K-16 educators in their emergency transition to remote learning and decided upon the formation of a Community of Practice (CoP).

A CoP is an evolving group with a shared goal of enhancing member knowledge and practice (Lave & Wenger, 1991). CoP have three primary characteristics: members 1) share a common domain of practice, 2) form relationships, 3) develop a shared knowledge base (Wenger, 2006). The development of a CoP promised the collaboration necessary for innovation and mutual support, but there was concern regarding how to form a CoP as educators shelter at home and were often working odd hours to accommodate family needs. This chapter presents the ways in which the TU team leveraged Twitter to form the CoP focused on remote learning and teaching.

INNOVATION

The team identified four main obstacles to remote learning due to school closures: 1) limited and uneven distribution of student resources for connecting with instructors, 2) need to address student stress and trauma, 3) limited options for synchronous learning, 4) instructor stress, apprehension, and feelings of isolation. The Twitter chat was designed to facilitate the formation of a CoP to address these concerns as well as concerns raised by the community as it evolved.

Why Use Twitter to Form a CoP?

With the majority of educators sheltering at home, Twitter offered a platform for CoP members to communicate and connect synchronously and asynchronously through chats, shared links, photos and videos. Educators increasingly use Twitter as a tool for self-directed professional learning (Luo, et al., 2017; Reilly, 2017) and school systems promote

Twitter as a professional learning tool (NASSP, 2019). Additionally, teachers have expressed the benefits of Twitter chats in reducing feelings of professional isolation (Staudt Willet, 2018). Twitter, therefore, offered a platform that teachers already used to connect and find mutual support. Thus, existing educator connectivity through Twitter made it an ideal platform to build a CoP for teachers transitioning to remote learning.

Twitter CoP Development

The remote learning CoP was developed with the express purpose of engaging a wide range of educators in order to draw upon a rich variety of experiences to support collaborative problem-solving, and sharing of ideas and resources. An original hashtag (#RemoteLearningChat) was generated to create an affinity space and index the CoP's work (Willet, 2020). Promotion of the chat emphasized the focus on community building, mutual support, and openness for educators with all manner of experience and expertise. A supporting website (http://tinyurl.com/remotelearningchat) was created to house the chat's description and purpose, chat topics, questions, information about chat leaders, and chat archives, further supporting the CoP indexing.

Many educator-based Twitter chats are held monthly and use a rapid pace to facilitate the quick sharing of ideas. Recognizing the immense psychological stressors of the current climate, #RemoteLearningChat was intentionally designed to focus on relationship building, generating mutual support, and combating educator isolation, and thus met more frequently and moved at a slower pace. The chat started with a twice a weekly, 30-minute synchronous format, limited to 3 question prompts. Chat topics were chosen to address the aforementioned instructional obstacles caused by school closures. The shorter, slower chats allowed ample time for multiple replies, sharing resources, posing questions to the group or individuals, sub-conversations, and retweeting. Chat facilitators reminded participants that asynchronous participation and revisiting or adding resources indexed by the hashtag were encouraged.

RESULTS

The CoP quickly expanded to a wide range of in-service and pre-service teachers, and teacher educators. #Remote-LearningChat fostered collective problem-solving, ideas and resource sharing, and relationship building. Participation ebbed and flowed as word spread and topics piqued interest. An average of 20 educators actively participated in the twice-weekly synchronous chats, with additional individuals participating asynchronously. The impact of the chat series went beyond those actively participating to "lurkers" - individuals reading, but not contributing to, the chat. Twitter analytics indicate initial tweets reached an average of 800 people with some tweets reaching several thousand.

Issues of equity, flexibility, and teacher mindsets were discussed. Group members agreed that emergency remote learning required a focus on student social-emotional health and building supportive online communities. Chat participants discussed new instructional practices and tools for remote teaching during the pandemic. Returning participants formed a community as evidenced by following of each other on Twitter, informal side conversations, sharing resources beyond synchronous chats, and posing questions to the group to support practice refinement. CoP members reported that #RemoteLearningChat had a positive impact on their ability to cope with the emergency transition, with the CoP supporting the adoption of new practices.

Most importantly, CoP member feedback acknowledged that the Twitter chat had reduced feelings of isolation by facilitating a virtual community of those with shared experiences during the pandemic-forced school closures. Participants comments such as, "It has been helpful to hear others' struggles," and "Loved seeing what my K12 colleagues are doing and learning from their experience." signaled that #RemoteLearningChat was able to make teachers working at home and in isolation during a crisis feel connected. Other participants commented on the feelings of support offered by the CoP, "I have really enjoyed the community and collaboration."

IMPLICATIONS

As noted earlier, the unprecedented wide-spread school closures caused by the 2020 pandemic created unique pedagogical challenges that could not be easily solved, even by those with prior knowledge of remote learning. The forma-

tion of a Twitter-based CoP helped to collectively address these unique problems of practice and support the shift approaches during the crisis. Those who wish to replicate this approach to teacher professional learning should address the following items:

1) define the Twitter affinity group to drive CoP membership,
2) facilitate relationship building as the foundation of the CoP,
3) encourage meaningful sharing among group members, and
4) respect participant time and effort during a stressful and chaotic.

Defining the Affinity Group

Previous research examining teacher use of Twitter for social learning focused on affinity groups dictated by academic subjects, grades, or region (Carpenter & Krutka, 2014; Gao &Li, 2017; Willet, 2019), #RemoteLearningChat, however, was purposefully broad in the definition of its membership criteria- one simply needed to be a K16 educator engaging in remote learning. It was valuable to engage a wide range of educators with diverse experience and expertise to generate innovative instructional approaches during the crisis. Reflecting on the different policies and practices utilized across varied educational systems assisted #RemoteLearningChat participants in formulating new, creative approaches toward remote learning. Purposefully including educators from a variety of backgrounds provided the flexibility and far-reach necessary to support innovative approaches to remote learning. Future attempts to use Twitter to form CoPs during times of upheaval must pay close attention to the benefits and limitations of how affinity group is defined.

Facilitating Relationship Building

In addition to emergency school closures, the majority of educators have no experience or limited experience with the amount of social isolation that came with pandemic quarantine measures. Mental health research indicates that intense feelings of isolation caused by the pandemic can cause psychological distress resulting in reduced capacity to focus and complete tasks (Brooks et al., 2020). Prior research indicates that educators cite Twitter as a way to ease feelings of professional loneliness (Staudt Willet, 2018). Thus, the formation of a CoP not only served to develop innovative practices to meet the unique challenges of pandemic-forced school closures, but also the intense social isolation teachers felt due to shelter at home practices.

#RemoteLearningChat facilitators placed intentional focus on educator mental health and need for social connections during the pandemic. This focus allowed the chat to help educators deal with the crisis and drove the CoP's focus on the social-emotional aspects of teaching and learning. Each chat started with a prompt for each participant to introduce themselves to the group and to share one small, positive thing from their day. This set a tone of positivity and openness. In addition to the serious work of collective problem solving, the group members shared memes, made jokes, offered support and encouragement, and supported the development of social presence for each other. Group members validated each other's anxiety and apprehension while cheering shared successes. The intentional relationship building of the chat was the foundation on which instructional change was made possible.

Encouraging Meaningful Sharing

The creation of the CoP proved useful in helping educators shift practices during a crisis. Participants reported that it was "helpful to see what others were doing" and to ask questions. Facilitators encouraged the sharing of materials and approaches by prompting chat participants to consider what types of resources, practices, and supports they needed (see figure 1.) As members voiced their needs, other members were able to share ideas in a more targeted and meaningful way.
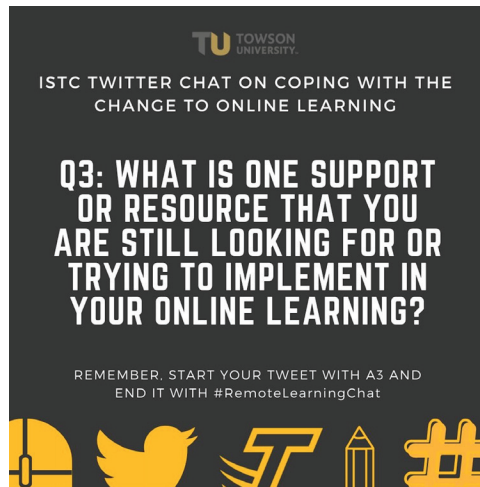
Figure 1. #RemoteLearningChat Prompt.

Respecting Participant Time and Effort

The pandemic forced social-distancing policies that required shelter-in-place mandates. Thus, many teachers were not only suddenly working from home, but doing so while caring for family members, sharing work spaces within the home, and volunteering to assist vulnerable community members. These new constraints of educator time and energy were considered in the planning of #RemoteLearningChat. The synchronous chat was purposefully only 30 minutes long. Additionally, participants who signaled that they had conflicts some evening were supported by the group and encouraged to participate asynchronously when they had time.

FUTURE RESEARCH

Twitter is an especially relevant tool when face-to-face options for social learning are not possible. The formation of the #RemoteLearningChat CoP was to support the emergency transition to remote learning was prompted by a pandemic. While this is a unique circumstance, schools around the world are routinely disrupted by natural and man-made disasters. Finding inexpensive, and fast ways to connect and support educators in times of crisis should be examined further.

The current pandemic revealed that even in times of crisis, educators desire to connect and learn as part of a community. Preliminary findings from the #RemoteLearningChat indicated that the Twitter-based CoP was helpful in not only generating innovative instructional practices, but in supporting emotional resilience among educators needed to provide social and emotional support to their students. Thus, we propose that the use of virtual CoPs to support teachers in times of crisis examine not only instructional practices, but teacher emotional well-being and sense of professional connectivity.

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Innovative Online Instruction: Synthesizing Learning and Video Game Consoles

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In this chapter we describe how educators can use internet-connected video game systems to support student learning. Specifically, we explain how teachers can leverage the private and party chat functions in the current models of the Xbox and PlayStation consoles for remote instruction. Private chat is a no-cost feature on Xbox and PlayStation consoles that allows the user to invite one other person to a private chat-room. Party chat allows the user to invite up to eight people to a private group chat-room. Resources are included for educators interested in learning more about using video game consoles and how to get started learning about online games. Future directions for researching teaching and learning using video game consoles are offered.

Keywords: distance learning, video games, online tutoring, synchronous communication, party chat, remote teaching, virtual collaboration, blended learning

INTRODUCTION

In this paper we offer a novel approach to distance teaching and tutoring by describing how teachers can use the private and party chat functions in the current models of the Xbox and PlayStation consoles for remote instruction. Private chat is a no-cost feature on Xbox and PlayStation consoles that allows the user to invite one other person to a private chat-room. Party chat allows the user to invite up to eight people to a private group chat-room. Party chat is free on the PlayStation; Xbox users must purchase an Xbox Live membership to participate in group chat.

By engaging with students over a video game console, teachers can draw on the understandings, skills, and experiences learners have acquired outside the classroom – their *funds of knowledge* – to leverage the cultural and personal knowledge that informs and shapes students' lives (González, Moll, & Amanti, 2005). Tapping students' funds of knowledge aligns with the tenets of 21st century learning that call for educators to "eliminate borders without requiring young people to give up or hide important features of their lives" (Phelan et al., 1991, p. 85).

INNOVATION

Technology offers new pathways for virtual interactions to take place, individually and collectively, across different media platforms. Harnessing the full power of technology for online instruction, however, will require teachers to strengthen their capacity for flexible thinking and creative problem solving. As Henriksen, Mishra, and Fisser (2016) point out, "...there is a reciprocal relationship between creativity and digital technologies. Here we mean that technologies allow for new and creative pedagogical practices, but also that educators must develop a creative mindset to teaching and learning" (p. 31).

Because they are staples of many American households, video game consoles are an ideal tool for educational repurposing. There are over 160 million video game console owners in the United States alone, and 84% of those consoles are connected to the internet (The Nielsen Company, 2018). Teachers who own, or whose children own a video game console can use the device to provide one-on-one and/or small group guidance to connect with some of their students.

With the sudden shift to online instruction teachers, students, and families who are adjusting to "home-schooling" may also be dealing with feelings of isolation and disconnection. Modifying instruction in order to maintain relationships with students is one way teachers can attend to learners' social and emotional well being (Kingsley & Olefumi, 2015). For example, educators are increasingly turning to video games like Assassin's Creed and Minecraft to reach students who are interested in online gaming (Favis, 2020).

In addition to actual gameplay, video game consoles can serve another purpose. When used in conjunction with collaborative educational platforms like Google Docs, teachers can use video game consoles as a communication tool to connect with students who need individual coaching or tutoring. In this case, the consoles provide an audio-only alternative to video conferencing. Instructional videos are available to support educators interested in getting started with Xbox One and PlayStation 4 video game consoles (see Table 1).

Table 1

Digital Resources for Using Party Chat on Xbox One or PlayStation 4

Getting started with Xbox One	https://www.youtube.com/watch?v=5784JpxM6C8
Set up party chat on Xbox One	https://www.youtube.com/watch?v=1_TtvHB2YGw
How to set up a PlayStation 4	https://www.youtube.com/watch?v=-rmUxcuPoBY
Set up party chat on PlayStation 4	https://www.youtube.com/watch?v=0snrhqfjoSg

The approach to scaffolded learning described here is informed by Routman's Optimal Learning Model (2018), where a teacher gradually releases control of learning to students. Routman argues that students are more likely to risk making mistakes while learning when they know they have the teacher's support if needed. Communicating via a gaming console reassures students that they have a tether to the teacher if they run into problems, have questions, or need guidance with an assignment.

RESULTS

The inspiration for this chapter stems from an experience one of the authors had as a National Board certified high school language arts teacher. He worked with a student who was struggling with a writing assignment and needed one-on-one coaching. Transportation issues and scheduling conflicts precluded meeting before or after school. Knowing that the student was a gamer, the author tutored this student online via the party chat function of the Xbox One gaming console.

To accomplish this the teacher shared his gamertag, the unique identifier a player uses to distinguish her/himself from other players, with the student and agreed upon a time to "meet." The student initiated the party chat at the designated time, and both were able to communicate orally via headsets to access and collaborate on the student's work via Google Docs. The teacher used his technological, content, and pedagogical knowledge, along with the devices and tools he was familiar with, to leverage the student's passion for gaming and his desire to grow as a writer to design instruction directed at the needs, interests, and identity of the learner (Henriksen et al., 2016).

Coaching and tutoring students using a technology tool that they are comfortable with can be a way for teachers to attend to a student's academic needs. In working one-on-one with the student on his own virtual "home turf," the teacher positioned himself as the *guide on the side* rather than the sage on the stage (King, 1993). This inversion of roles places the student at the center of the writing process, while the teacher provides context, resources, and supportive feedback using constructivist approaches that "prepares students for the independent action of a self-guided learner" (Koenig, 2010, p. 32).

IMPLICATIONS

The technological, pedagogical, and content knowledge (TPACK) framework is a useful tool for helping educators think creatively about how to adapt digital devices for teaching and learning. As Mishra and Koehler (2009) have noted: "The idea of creative repurposing is important because most technologies that teachers use typically have not been designed for educational purposes" (p. 16). For learners who are also gamers, seeing a teacher's willingness to use a game console for online instruction can be motivating and empowering. When educators consider game consoles as a tool for teaching, they are embracing a technology that plays a significant role in the lives of many young people.

To utilize video game consoles for instruction, teachers must know their student's gamertag. Teachers can use their student's gamertag to send a message or invitation to a private or party chat via the gaming system. Party chat is useful

when the teacher initiates the party and wants students to be able to join the conversation at any time. Private chat is a better option for students who need individual tutoring or coaching. Alternatively, teachers can share their own gamertag with one or more students so that any of them can initiate a real-time electronic conversation. Table 2 contains resources for educators who want to integrate video games into their practice.

Table 2
Resources to Facilitate Video Game Integration

How to Integrate and Manage Video Games in Your Classroom (Aviles, 2018)	http://www.techedupteacher.com/how-to-integrate-and-manage-video-games-in-your-classroom/
7 Ways to Integrate Video Games into Your Classroom (Clark, 2019)	https://www.classcraft.com/blog/features/video-games-in-the-classroom/
How to Find Games for Classroom Learning (Farber, 2020)	https://www.edutopia.org/article/how-find-classroom-learning
How To Integrate Video Games In The Classroom (Heick, 2017)	https://www.teachthought.com/technology/how-to-integrate-video-games-in-the-classroom/
Game And Learn: An Introduction to Educational Gaming - Podcast	https://podcasts.apple.com/us/podcast/game-learn-introduction-to-educational-gaming-audio/id429426265

The virtual chat room is independent of any specific video game, and no actual game play is required to take advantage of this feature. By engaging in the party or private chat while simultaneously working within a web-based, collaborative space like a Google Doc, the party members can communicate verbally while collaborating digitally. In the case of writing instruction, the author was able to access the student's writing assignment through Google Docs in order to provide real-time, oral feedback on specific sentences and passages to help the student grow as a writer. It also allowed him to model, in the moment, how to create citations for references and include hyperlinks for a blog post. The strategy of tutoring via video game console while using a learning platform can be employed by both pre- and inservice teachers.

For teachers interested in the professional literature on how digital games support teaching, learning and assessment, Table 3 provides suggested readings.

Table 3
Resources Related to Teacher Education and Video Games

Teaching to Teach (with) Game Design: Game Design and Learning Workshops for Preservice Teachers (Akcaoglu & Kale, 2016)	https://citejournal.org/volume-16/issue-1-16/general/teaching-to-teach-with-game-design-game-design-and-learning-workshops-for-preservice-teachers/
Why Digital Game Based Learning Should be Included in Teacher Education (Gabriel, 2016)	https://pdfs.semanticscholar.org/0452/13525dd3a021cf0339232b68a23ea6364303.pdf
Player Professional Development: A case Study of Teacher Resiliency within a Community of Practice (Garcia & Gomez, 2017)	https://www.sciencedirect.com/science/article/abs/pii/S0742051X17307898?via%3Dihub
Digital Game-Based Learning: It's Not Just the Digital Natives Who Are Restless (Van Eck, 2006)	https://er.educause.edu/articles/2006/1/digital-game-based-learning-its-not-just-the-digital-natives-who-are-restless
Digital Games and Learning: Research and Theory (Whitton, 2014)	https://www.amazon.com/Digital-Games-Learning-Research-Theory/dp/041562939X

Although a discussion about privacy and online security is beyond the scope of this paper, cyber safety is a relevant issue for all educators working in online environments. The choice to use gaming systems for teaching and tutoring should be left to individual educators, schools, and/or districts. All teachers should familiarize themselves with their school's acceptable use policies, however, and should obtain approval before using game consoles for educational purposes.

FUTURE RESEARCH

Looking forward, researchers might explore how video game consoles can be used to support an array of instructional approaches for students who have access to internet connected game systems. It may be helpful to identify which students might benefit most from virtual learning using video game consoles in blended and online environments. This might include, for example, English learners, students with special needs, or children who have historically been disenfranchised by mainstream education. More research is needed on issues of privacy and consent as they relate to online educational communications. Researchers may also want to explore teacher and student preferences for distance education tools, including teacher beliefs regarding the use of video game consoles with students. Best practices for integrating digital game based learning into teacher preparation programs should also be explored.

In the meantime, it is incumbent on teacher educators to develop the knowledge, skills and dispositions needed to guide preservice and inservice teachers through the challenge of retooling, repurposing, and reconceiving, again and again, technology designed for other purposes (Henriksen et al, 2016). Twenty first-century teaching necessitates that all educators update their praxis to infuse contemporary digital tools into their blended and online teaching.

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Enabling Music Students' Well-Being through Regular Zoom Cohort Chats During the Covid-19 Crises

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The required shift to online music teaching due to COVID-19 resulted in Teacher Education music students needing different approaches for well-being supported through innovative uses of technology for community, collaboration and connection. Using Samaras' five elements of self-study, two music education instructors in an Australian conservatoire explored the results of regular, weekly live-stream cohort chats (i.e., Wednesday Zoom Café) when facing an unprecedented crisis. Based on the findings, the innovative use of a Zoom café can result when technology is used to: support music student well-being; support organizational design, facilitate clarity of communication; and, create connection, identity and community through socially-constructed technology application.

Using these approaches, live-streamed cohort chats can support pre-service music students' positive well-being during a time of unprecedented lockdown and consequential social isolation.

INTRODUCTION

Pre-COVID-19, higher education music performance students evidenced performance-related health and well-being challenges (Spahn, Voltmer, Mornell, & Nusseck, 2017). With well-being risks increased due to the unprecedented crisis itself, attention to music education students' social, emotional, and academic learning needs became paramount for instructors. The limited research in fully online music education programmes (Groulx & Hernly, 2010; Johnson, 2017) made the need for disruptive technology innovation necessary. The purpose of this paper is to: 1) identify how technology can be used for student well-being during a crisis; 2) highlight innovative and adaptive teaching strategies learned from a weekly ZOOM café (i.e., student well-being supported through technology; regular contact and communication with students; and motivation and self-regulation). Technology plays an important role in supporting learning communities (Mayordomo & Onrubia, 2015). Using Samaras (2011) self-study methodology, Zimmerman's cycle of self-regulation model (2002) frames the reflections that emerged from students and instructors.

INNOVATION

Music education programmes, with their focus on in-class, and in-studio performance teaching, experienced abrupt changes in teaching overnight in response to COVID-19. Given the pervasiveness of Zoom for live-stream teaching, the innovative use of a ZOOM Café facilitated community, collaboration, self-regulation and connection for music education students and instructors who experienced disconnection from regular in-class, performance halls and hallway interactions.

The weekly 30-minute online Zoom café comprised of informal discussions between all program instructors and students. Focusing on student well-being, program instructors made themselves available and organized the initial café as a communication mechanism to alleviate confusion about programming during the progressive steps of total lockdown.

Students responded with such eager attendance that instructors' resolved to assist and offer continuous weekly advice and solutions through the Zoom café. In addition to programmatic advice and unexpected student concerns and questions, a range of targeted topics on well-being became central to the conversations. The café occurred at the same time, on the same day, using the same weekly Zoom link to underpin easy access for all.

Student voice was key and opportunity to share and hear from each student during the sessions were provided. Examples of questions used to support, encourage, and invite students to contribute to the conversations included: What are you grateful for today?; What challenges have you experienced this week?; What strategies have you found useful in managing your well-being? The voluntary nature of the environment allowed students to particiate without fear of judgment, and subsequently, many attended just to listen and collaborate with their peers akin to their music ensemble environments. During sessions, students were asked to share a personal reflection, thought or well-being activity related to their COVID-19 experience.

On reflection, the innovation evidenced an adaptive leadership model (Randall & Coakley, 2007); instructors collaborated to identify needs and elicit strategic responses to engage all stakeholders (i.e., students and instructors). Important aspects of the innovation included student voice and issues pertinent to them during this time which aligned which aligned with the adaptive leadership model.

RESULTS

The essence of the results stems from self-study which is the provision of "strong personal reference in that it involves study of the self and study by the self" (Samaras & Freese, 2006, p. 12) for practitioners. Samaras' (2011) five key elements of self-study were aligned with the study in the following manner: Personal situated inquiry; Inquiry through critical collaboration; Improvement of learning; Transparent and systematic research process; and Knowledge generation and presentation.

Meaningful engagement resulted as students were also asked to reflect and share experiences from their COVID-19 journey. Non-verbal indications of well-being were expressed through personalized virtual backgrounds (e.g., artworks, landscapes, album covers, etc.). Together, these expressions undergirded responsive and motivational mindsets to support student resilience.

Table 1
Number of student participants for Weeks 1-10 of Semester

Semester Week	1	2	3	4	5	(Pause week)	6	7	8	9	10
Number of Participants	0	0	53	27	26	12	16	17	8	13	12

The following four themes identify key outcomes that resulted from adoption of the innovation: Inclusion of Well-being through Technology; Use Organizational Design through Technology; Support Clarity of Communication through Technology; Facilitate Motivation through Socially-Constructed Technology.

IMPLICATIONS

The success of the Zoom chat experience arose from responding to students needs as they evolved. Mindful approaches to fluidity of a scenario, while not over-thinking the details, promoted effective well-being outcomes for students and instructors.

Technology as Support for Music Student Well-being

Faced with many well-being challenges due to isolation, the ZOOM café highlighted how students used the opportunity to publicly listen and share in peer experiences. Online interactions and reflections of the instructors also highlighted

how students shared helpful physical exercise routines, and strategies they undertook. The Ecological Model of the Relationships between Music and Life (Rickard & McFerran, 2012) highlights the four elements: culture, relationships, the individual and brain. These elements support the need for balance, identity and purpose as an integral part to successful musicianship and music learning. Arts-based cultures rely on community experience to support their mutual creative learning experience (Seddon, 2012).

Technology to Support Organizational Design

Uncontrollable factors (e.g., limited resource accessibility, technology downtime, etc.) were often unpredictable during this scenario. Design of weekly Zoom chats reflects key aspects of music ensemble participation including routine and predictable peer relationships (see Ros-Morente, Oriola-Requena, Gustems-Canicer & Filella Guiu, 2019). Incorporation of similar design structure can further relieve anxiety and permit opportunities to forecast possible areas of concern, and pro-actively manage them, as needed. The design of the sessions, albeit structured around the needs of the students in an informal manner, alerted students to be attentive to potential change. Organizational forecasting through a Zoom chat alerted to factors that could impact studies while ensuring stability in a rapidly-changing situation. There was a natural flow on effect whereby no-attendees received updates from these sessions. Importantly, the ZOOM café was a flexible learning experience (Picciano, 2017).

Technology Use to Support Clarity of Communication

The design of the sessions, albeit structured around the needs of the students in an informal manner, alerted students to be attentive to potential change. Enabling positive coping (learning discussions and practical supports) are important mechanisms for students learning at home (Sollis, 2019). Organizational forecasting (Mumford, Steele, McIntosh, & Mulhearn, 2015) through a Zoom chat alerted to factors that could impact studies while ensuring stability in a rapidly-changing situation. There was a natural flow-on effect whereby those unable to attend received updates from these sessions.

Connection, Identity and Community through Socially-Constructed Technology

Technology needs to be learned. It must be complementary and responsive when supporting learner needs (Kozma, 1991). With in-person conversations impossible during COVID-19, creating opportunities for music education students to connect and share their music life together became critical. Over time, the community personified collaborative and creative expression and reflected further features of their pre-COVID-19 musical routine (i.e., performing together). The level of crisis was deemed manageable through regulation. That is, similar to skilful regulators (see Zimmerman, 2002) who focus heavily on the process rather than product, these students exhibited behaviors that were akin to their identities once again as expert musicians.

FUTURE RESEARCH

The post-COVID-19 scenario will likely require further use of the online environment for music education and teacher training. Future research is needed for both student-based and instructor-based technology adoption in online music education. Studies should investigate the use of community music and well-being experiences (i.e., self-regulation, empathy and motivation) to offer insights into how social technology supports participant engagement, communication, identity, creativity and community aspects for the learner. The implications further evidence the need to explore a technology-centred hierarchy of needs (see Maslow, 1943) with a combination of learning experiences aligned to Blooms Taxonomy (Krathwohl, 2002). Finally, investigating the use and value of technology for music education students' well-being, in accordance to online teacher- and pre-service teacher- training, is warranted.

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Empowering Techno-resiliency and Practical Learning Among Teachers: Leveraging a Community of Practice Model Using Microsoft Teams

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This paper explores one approach to the empowerment of teachers as played out in a polytechnic in Alberta, CA during the recent pivot to online learning. Grounded in the principles of community of practice (CoP) and techno-resiliency, the initiative used Microsoft Teams as a collaborative tool and enabled more than 280 teachers to increase their remote teaching skills in under six weeks. This same strategy is replicable by other teacher groups ranging from pre-service to public school to post-secondary settings. Other tools such as Zoom and WebEx can advance the same goals. Pre-service teachers may be at particular advantage in their use of collaborative tools since many of them live technology-defined lives. Public school teachers may also be advantaged over post-secondary educators whose participation in professional development is generally voluntary.

INTRODUCTION

On March 14, 2020, the Southern Alberta Institute of Technology (SAIT) suspended all face-to-face classes and announced that online classes would begin on March 19 (SAIT Now, 2020). While those who had previously adopted technology-enhanced strategies were better prepared than others, because many SAIT programs are applied and include apprenticeships, all delivery options were considered in relation to program requirements (SAIT Now, 2020). Although departments did their best, messages were frequently mixed and teachers were often unsure about how to proceed. This was SAIT's first fully online term in its 104-year history. With a big problem to solve, educational leaders established a virtual community of practice (CoP). This virtual form of Wenger's (1998) CoP leveraged the capabilities of Microsoft Teams, and enabled teachers to experience professional resiliency (Graham, 2016) and discover practical solutions to the challenges facing them.

INNOVATION

In three days, over 600+ full-time and adjunct part-time teachers had to pivot to remote teaching. Early in this transition, it became clear that peer-to-peer supports were required; there were too many teachers needing assistance for the educational development team to provide individualized coaching.

Tasked with supporting this transition, the Centre for Academic Development and Innovation (CADI) created the Digital Learning Exchange for Faculty and Staff (DLE) using MS Teams by day two of the transition (see Appendix A). Leveraging a CoP model (Lave, &Wenger, 1991; Wenger, 1998), teachers who had previously transitioned to remote teaching supported other teachers through highly relevant mentoring (Carter, Salyers, Page, Williams, Hofsink, & Albl, 2011). As new-to-online teachers learned new strategies, they shared them in the easy to access virtual space.

MS Teams emerged as a viable means for connecting and experiencing professional learning. A Teams space was dedicated to exploring digital learning, and channels (discussion spaces) such as 'Ask a Question' and 'Workshops, Webinars and Time Sensitive Events' (see Appendix B) were used. Members had access to a 'Files' folder which housed shared documents, and an 'FAQ' folder (see Appendix B) was placed in various channels as needed. Files were organized, discussions were tagged for easy searching, and video and private chats (video and text) happened when needed.

As the DLE matured, other channels were added, and teachers were offered one-hour café style video chats with colleagues with online experience. The members collaborated through postings as well as discussion, video, and chat tools (Dubé, Bourhis, & Jacob, 2005). An experienced online teacher moderated the CoP and ensured that it remained viable and active. A 'Terms of Reference' (see Appendix C) was eventually drafted for use by the community.

After initial setup, the CADI team promoted this virtual community through institutional media outlets including direct email, departmental meeting notices, and newsletters from senior leaders. Teachers were encouraged to inspire their peers to join.

RESULTS

Initially, the issues explored in the DLE reflected novice experience: the sharing was technical in nature, and a 'duct tape and bandages' approach was evident as teachers sought to find technologies to replicate face-to-face teaching. However, once technology needs were addressed, pedagogical considerations presented, leading to richer conversations.

Storytelling emerged as a particularly valuable way of generating techno-resiliency and professional confidence. While CoPs and MS Teams may have been relatively new to many teachers, ideas about collaboration and inquiry to foster professional development are not. Contemporary ideas about CoP tie to Pierce's concept of a community of inquiry (Shields, 2003) and Dewey's ideas about learning through occupation (Dewey, 1929; Wallace, Sheffield, Rennie, & Venville, 2007). Communities of practice have likewise been linked to other learning theories emphasizing story telling which was borne out in the SAIT experience (Brown, & Peck, 2018; Farnsworth, Kleanthous, & Wenger-Trayner, 2016). Finally, since the SAIT teachers were working from home, this virtual CoP became an important part of their support system.

According to Garfield (2018), communities of practice function best when they are independent of overarching organizational structures; when membership is voluntary but there is a critical mass of members; and when there is nurturing. SAIT's approach reflected these ideas: the community of practice achieved through MS Teams was representative of a diverse group of teachers who chose to participate and share experiences. Further, its evolution was nurtured. At the time of writing, this CoP has 285 members, with teachers adding themselves as they learn about it.

IMPLICATIONS

The most outstanding lesson was that SAIT teachers were willing to spend time supporting peers transitioning to remote teaching: some created SAIT-specific videos; others prepared screen shots, compiled resource lists, and participated in off-line chats. Library faculty, media specialists, and academic leaders stepped forward to answer questions. Participants who found answers outside of the DLE brought their knowledge back to the group. Given these outcomes, the scope of the DLE as described below was appropriate. The DLE was

> … a place for peer to peer sharing (in real time; and over time) /crowd sourcing Q&A/resources/upcoming PD opportunities; and for instructional expertise (in real time) to direct faculty, staff and leaders to … other resources as needed; it is also (over time) a place where faculty, staff and leaders can connect with Educational Developers and each other, to work to improve and implement ideas for teaching in a digital space – presence, engagement, inclusion, assessments, and beyond. (SAIT, 2020a)

Four functional guidelines put in place likewise worked well: that the DLE was foremost a CoP; that it was co-created by its members; that members were critical consumers of information; and that all postings were the opinions, experiences, or practices of the individual making the posting (SAIT, 2020a).

Overall, SAIT teachers, educational leaders, and staff learned that a CoP is about social construction of knowledge and bringing theory to life. Participants shared a common interest, and worked to fulfill personal and collective goals (Duguid, 2005). The participants likewise learned that they did not have to be space-located to form community. As de-

scribed earlier, the assets of MS Teams were used to create a virtual CoP (Dubé, Bourhis, & Jacob, 2005). Notably, there are other reliable collaborative platforms available such as WebEx and Zoom (see Appendix D).

The SAIT experience emphasized that remote teaching is an interprofessional team experience (Carter, Salyers, Myers, Hipfner, Hoffart, MacLean, White, Matus, Forssman, & Barrett, 2014). It is not the same as classroom-based teaching which, in general, does not involve stakeholders beyond the teacher and the class. Those who work in online education know that, ideally, quality remote teaching involves teachers, subject matter experts, instructional designers, media experts, learning technologists, and academic decision makers working together over months to create meaningful learning experiences. In Spring 2020, online learning was still a 'team sport' but with significant dependence on the generosity of colleagues to collaborate quickly.

The implications of this experience are many. Before 2020, many students sought technology-enriched teaching and learning or TETL opportunities but to greater and lesser success (Graham, 2016). The pandemic, however, crystalized the need for competent techno-resilient educators (Graham, 2016). Simply put, this moment in educational history is a coming of age for TETL and the virtual CoP (Dubé, Bourhis, & Jacob, 2005). A responsive virtual community can enhance professional practice and, ultimately, student learning.

The SAIT experience holds specific implications for those in the pre-service teacher sector as well as practicing teachers in public schools. As mentioned earlier, many teacher candidates have grown up with technology and may be advantaged in the use of technology in daily life (Brocade, 2011). What they may not have is knowledge about how to use technology to support learning. With TETL here to stay, not to become a skilled remote teacher would be short-sighted. Positively, pre-service teachers may be able to work with their instructors to establish a virtual CoP using the collaboration platforms of their school or faculty. Alternately, pre-service teachers may choose to self-organize and develop their own communities. Either way, the wins are substantive.

As for teachers employed in public schools, the learning facilitated by a virtual CoP is equally important. How an online CoP fits with the professional development practices of boards and schools, however, will certainly vary. Regardless, in public education in general, there is recognition that teachers need to advance their instructional practices on a regular basis. This is not always a requirement in the post-secondary setting.

Finally, institutional or employer support is not necessary to launch a virtual CoP. A small motivated team can launch one, and, once it is launched, it may assume a life of its own with limited cultivation. Moreover, if a community dissipates over time, this is not necessarily a bad thing: it may have served its purpose.

FUTURE RESEARCH

Future research based on the CoP described here include exploration of the following questions: How did this virtual community help teachers in the early days of the Co-Vid 19 pandemic? What were the lasting benefits for teachers? How did students benefit as their teachers transitioned to remote learning? Extrapolating, research into the efficacy of collaborative tools for professional learning in other educational contexts including pre-service settings and public education as well as the specialty programs offered by colleges and universities is strongly recommended.

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APPENDIX A

SCREENSHOT OF THE DLE SETUP
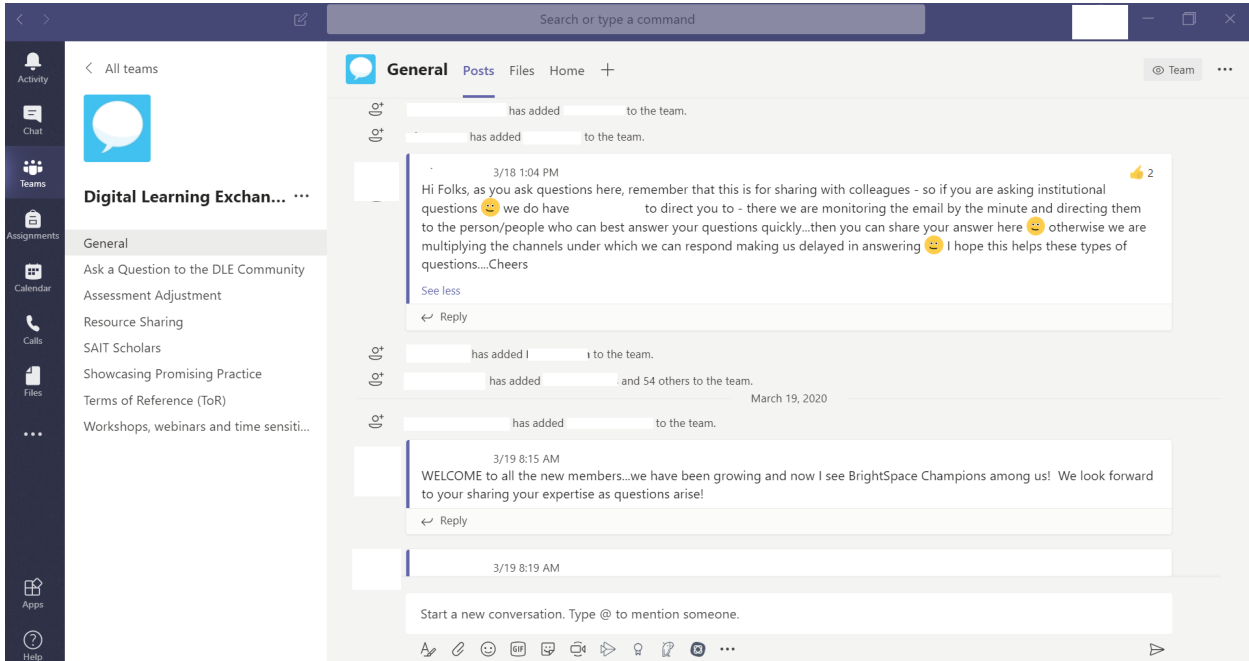
APPENDIX B

ASK A QUESTION CHANNEL

APPENDIX C

SCREENSHOT OF THE TERMS OF REFERENCE CHANNEL

COLLABORATION TOOLS

Collaboration Tools
Resources

Zoom	Notes
Access	• Free basic account • Licensed accounts if serving as meeting host
Good for:	• Larger meetings including external contacts • Webinars, up to 100 attendees
Not so good for:	• Some security concerns
Tips and Tricks	• Use basic account for 1:1 conversations, for small meetings, or for joining meetings (rather than running a meeting) • Breakout rooms, polling, and chat functionalities • Supports recurring meetings • Plugin to Outlook • Virtual backgrounds can be accommodated
Resources	https://www.linkedin.com/learning/learning-zoom/stay-connected-with-zoom-meetings?u=56982905 https://www.youtube.com/watch?v=UTXUmoNsgg0

MS Teams	Notes
Access	• Call functionality very similar to Zoom • Variety of collaboration tools to enable document editing, project tracking, and more
Good for:	• Internal meetings and collaboration • Chat function can reduce email volume • Collaborating on documents can help with versioning and minimize back and forth through email • Whiteboard similar to Adobe Connect • When sharing screen, someone else can request access
Not so good for:	• Good all-round functionality
Tips and Tricks	• Recommend training • Built-in help features • Start a chat or group with regular collaborators
Resources	https://www.linkedin.com/learning/microsoft-teams-essential-training-5/communicate-effectively-using-microsoft-teams?u=56982905

WebEx	Notes
Access	• Through institutional licensing arrangement
Good for:	• From 1 to 1 conversations to large meetings
Not so good for:	• Small group work via breakout rooms • WebEx Training Centre not very user friendly
Tips and Tricks	• Use WebEx Meetings for video/audio/screen sharing • WebEx Training Centre for breakout rooms/polling/quizzing • Can add a WebEx meeting to an Outlook calendar invite
Resources	https://help.webex.com/en-us/nrebr3c/Get-Started-with-Cisco-Webex-Meetings-for-Hosts Appreciation is expressed to the Staff at McMaster University Continuing Education for this resource prepared in Spring 2020.

Virtual CoffeeEdu: Connecting Educators through Online Conversation

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Typically, CoffeeEdu events are 60-minute, informal professional learning opportunities often held at coffee shops or restaurants. During the COVID-19 pandemic, hosting face-to-face CoffeeEdu events was not possible, therefore the CoffeeEdu events went virtual using video conferencing. During a CoffeeEdu, educators, across grade-levels and subject areas, connect with each other to share teaching practices. Being participant-driven, the topics of discussion emerge from the participants' needs and interests. To continue professional learning for both pre-service and in-serviced educators during quarantine, virtual CoffeeEdu events supported the sharing of resources and advice along with providing empathy and solidarity from others in similar contexts.

Keywords: professional learning, professional learning network, unconference, CoffeeEdu, pre-service teachers, in-service teachers, professional development

INTRODUCTION

Typically, CoffeeEdu events are 60-minute, informal professional learning opportunities often held at coffee shops or restaurants (Keeler, 2020). The concept of a CoffeeEdu was established by Alice Keeler and based on the principles of an unconference, where there is no preset schedule of sessions or presenters and the focus is on expanding educators' professional learning networks. During an event, educators, across grade-levels and subject areas, connect with each other to share teaching practices. Being participant-driven, the topics of discussion emerge from the participants' needs and interests. CoffeeEdu events exemplify several characteristics that support effective professional learning: voluntary participation, sustained involvement, collaboration, self-reflection, and valuing the experience and expertise of the teachers involved (Kooy, 2009). Beyond this, CoffeeEdu events value the expertise of localized knowledge, personal/professional teacher knowledge, and provide for social and collaborative learning.

Educators, at both the pre-service and in-service level, need the opportunity to connect with each other and share practice (Whitby & Anderson, 2014). During the COVID-19 pandemic, hosting face-to-face CoffeeEdu events was not possible, therefore the CoffeeEdu events went virtual. This chapter illustrates how I conducted virtual CoffeeEdu events for educators and considers the impact of informal professional learning events like CoffeeEdu on educators.

INNOVATION

During the COVID-10 pandemic, I hosted three virtual CoffeeEdu events; one for pre-service teachers at our college of education and two for our local school district. The district was part of our college's professional partnerships, therefore we had attendees from both the district and the college. I facilitated these events through our university's video conferencing platform, Zoom. The invitations went out by email with an embedded link that included a password to reduce the possibility of Zoombombers. In addition, I reviewed the security settings on my Zoom meeting to ensure only authorized participants could enter and share their screens.

For both audiences, I started the conversation with defining a CoffeeEdu event, whether it was face-to-face or virtual. Then I asked participants to introduce themselves. With fewer participants in the pre-service teacher event, it was easy to do on-screen introductions, but for the district events with 40+ people, I asked them to introduce themselves in the chat window. I then asked participants to post questions they wanted to discuss in the chat. With a large group of participants on Zoom, it was important to provide guidelines for participation, such as raising hands, using the chat room, and muting oneself when not speaking.

Recognizing the need to build community in a short amount of time, I asked the first question to get the conversation started, "What has been working for you personally during the staying safer at home orders?" As the participants discussed that question, I reviewed the questions in the chat and made a list for myself to remember what the participants wanted to talk about. With a large group on Zoom, it was easy for people to talk over each other, so I guided the flow of conversation by looking for people who raised their hands, physically or with the raise-hand button, or who unmuted themselves. There was a second line of conversation that happened concurrently in the chat, with people sharing additional ideas, resources, and links. Even though the conversation could have continued, I ended the meeting after 60 minutes, knowing we all had other responsibilities. In addition, one of the defining features of CoffeeEdu is that it lasts only one hour.

RESULTS

During the virtual events, the participants expressed appreciation for the opportunity to connect with each other in an informal way and share strategies and resources for navigating the unusual circumstances of COVID-19 quarantine.

Our college had gone online for remote learning for almost all classes. During their CoffeeEdu meeting, the pre-service teachers discussed the difficulties returning to their parents' homes, the loss of expected activities and events on campus, trying to learn online when they preferred face-to-face, and strategies to stay motivated with unstructured time. They indicated appreciation for learning that they were not the only ones struggling and valued the advice from their peers.

The local school district taskforce had created a continuous learning plan that included paper packets that were sent home and any online contact was optional for students. During their CoffeeEdu events, the district educators shared strategies that worked for them as teachers to stay motivated and organized with continuous learning and how they were connecting with children and families using both technology and traditional methods. In the second CoffeeEdu, the educators discussed bringing closure to the school year for both their students and themselves. But, most importantly, in both meetings, they found support from others who could truly sympathize about missing their students, balancing parenting and teaching, and managing their own mental health while working from home.

IMPLICATIONS

Unconferences are voluntary, informal professional learning opportunities for educators that are designed by the participants. Rather than a having a preset agenda, speakers, or sessions, unconferences value the expertise and knowledge of the participants by incorporating their questions, concerns, skills, and knowledge into the event. Unconferences encourage educator collaboration, active participation, and educator autonomy – all features of effective professional learning (Carpenter & Linton, 2016; Darling-Hammond et al., 2017). Some of the better known unconferences have been EdCamps, which are typically full-day events, and CoffeeEdus, which are hour-long meetings of educators.

From a qualitative anonymous survey I conducted pre-COVID-19 with educators from across the country who participated in face-to-face CoffeeEdu events, several benefits of attending a CoffeeEdu event were reported. First, CoffeeEdu events were a way to build and sustain their personal/professional learning networks. Some mentioned how much they appreciated meeting their colleagues from social media in a face-to-face situation and having the opportunity to build stronger ties to them. Educators also emphasized the importance of the professional support they felt in the group. In addition, because participants in CoffeeEdu events came from different schools, educators felt that there was more opportunity to hear a variety of perspectives and gain knowledge from people with different experiences.

Many of these same perspectives were expressed throughout the virtual CoffeeEdu events. Since the CoffeeEdu invitation went to all students in the education program, the participants in the pre-service teachers' event represented a range of content areas and years in the program. Students in early field experiences were able to connect with others in their last semester of coursework, and secondary education students heard from elementary education students. The pre-service teachers expressed an appreciation for an unstructured time to talk with other students to get to know them and hear how others were managing the situation.

The CoffeeEdu sessions with the local school district connected educators from across grade levels and subject areas. Even though their content areas were different, the sharing of ideas and resources for supporting communication and

relationship building was applicable across contexts.   In addition, some of our college of education faculty attended and were able to hear the successes and concerns from the teachers about remote learning. They were able to offer resources and incorporate the teachers' experience within their coursework with pre-service teachers. CoffeeEdu was a mutually beneficial event for our college of education and our partner school district.

For colleges, schools, and districts looking for professional learning opportunities that celebrate the knowledge and expertise of their own educators, CoffeeEdu could be a useful format – either face-to-face or virtually. As a connected form of learning, CoffeeEdu events provide educators the opportunity to experience forms of learning that rely on active participation and personal choice (Oddone et al., 2019) – elements of pedagogy that are in demand in the classrooms of the 21st century (Soulé & Warrick, 2015).

FUTURE RESEARCH

There is a body of research about unconferences like EdCamps (which have been around for about a decade) that illustrate the power of an informal format for professional learning that honors teachers' knowledge and experience (Carpenter & Linton, 2016; Wake & Mills, 2014; Whitlock, 2016). However, there is no empirical research specifically about CoffeeEdu. This model of professional learning has been a movement since about 2014 and hundreds of educators have been involved in meetings, as illustrated through the hashtag #CoffeeEdu. There is a need to understand the professional learning that happens through CofffeEdu events, educators' motivation and engagement in the events, and the long-term impact of CoffeeEdu events on educators' professional learning networks and teaching practice. As a CoffeeEdu event can be hosted in-person or virtually, it can continue to be a form of professional learning and collaboration for educators, no matter the context of education in the future.

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It's About How To Pivot: Teacher Educators, Teacher Candidates and Twitter

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Teacher educators are to support teacher candidates. In this study, we sought to support our teacher candidates through helping them build life-long professional relationships with the use of Twitter. A Twitter Challenge to scaffold teacher candidate's use of social media was created before the COVID-19 pandemic to provide our teacher candidates a space to share practical pedagogical advice. We thematically analyzed a sample of Tweets to better understand the knowledge built through the use of Twitter both before and after school closures due to COVID-19. Fortuitously, this challenge provided teacher candidates a network of educators to share teacher knowledge, build on ideas, provide resources, validate professionals in the educational space, and ask questions. We see Twitter filling a gap within the traditional professional development community.

INTRODUCTION

How might we better support teachers through online options during the COVID-19 crisis? Seeking to implement systematic methods for teacher educators to facilitate teacher candidates beyond the traditional face-to-face structure, we highlight practical ways to deliver emergency professional development that is sustainable, long-term, and realistic. These involve novel pedagogies, new curriculum resources, and easy-to-use assessments within the design of self-directed professional development (PD). We are three teacher educators, at three different intuitions, making pragmatic, pedagogical changes for teacher candidates (TCs) as part of their educator preparation programs (EPP). Our goal is to prepare TCs with the best support, before, during, and after their teaching practice experience, no matter the context, by creating a preservice teacher professional learning network (PLN).

The professional development opportunities provided are autonomous and offer student choice and voice, both as a model for PD, and as a way for teacher candidates to continue their PLN throughout their careers as practicing educators. As we know, learning is not confined to the four walls of a classroom, it can happen anytime and anywhere. Now with the ubiquitous nature of mobile devices, learning can happen with the tap of an app. Teacher candidates in our EPPs can harness the same avenues for PD – no matter the geography, nor temporal space limitations, of their school placements. This Twitter Challenge was timely, as some of our TCs were faced with Spring's mid-semester pivot and school building closures, due to COVID-19. The pandemic brought our attention to supporting TCs beyond their professors and classmates. Our own personal, cross-institutional, collaborative networking via Twitter as teacher educators was indispensable for us in helping our candidates. We relied on one another to collaborate, question, and support our teaching, and we wanted our TCs to develop the same kind of supportive network for themselves.

Twitter was selected due to its affordances including a) timely ideas, b) responsive feedback specific to remote teaching, c) strategic guidance, d) connections to practicing educators, administrators, peers, and other higher education faculty. Most importantly, using Twitter meets our teacher candidates where they are - on social media. We use this social

media platform to support connecting and learning. Carpenter and Krutka (2015) share that social media platforms, like Twitter, provide educators with interactions and feedback that are timely, immediate, conversational, and personal. Our TCs received pragmatic suggestions to try out and think about tools and resources, to help make things work and flow in an online classroom.

Social media tools emphasize the social nature of learning (Vygotsky, 1978) and involve the use of shared interactions and feedback for the development of understanding particular skills and the profession (Carpenter and Krutka, 2015; Trust, Krutka, & Carpenter, 2016). This twitter PLN is constructed as a productive space to engage in shared learning and participating in the development of a community, beyond brick and mortar. (Hseih, 2017; Lave & Wegner, 1991).

INNOVATION

Our relationship as teacher educators began virtually, on Twitter in 2019. We built relationships, shared pedagogical strategies and resources, eventually meeting face-to–face, months later, at a professional conference. This networking contributed to the creation of the #PSTPLN Twitter Challenge https://www.smore.com/uj7df   . The Twitter Challenge is an activity, included on each of our syllabi, which guides TCs through week-long social media engagement. TCs create a variety of social media accounts, introduce themselves to the community, share resources, and connect with others. Instead of immediately requiring them to participate in a hash tagged chat, we utilized scaffolded instruction to ease them into the social media experience. Throughout the challenge TCs are provided with content to support their learning such as links to podcast episodes and blog posts. To encourage a participatory culture, the tasks include opportunities for involvement as collaborators and creators. This also incorporates networking lists for professional growth. This socially constructed learning develops confidence and self-efficacy in a low-risk environment where our TCs can be peripheral or central (Lave & Wegner, 1991).

Table 1
Scaffolded Professional Development

Day	Pre-Teaching	Task
Setup	Podcast Tips to get started https://www.sfecich.com/post/pstpln-challenge-accepted	Set up Twitter account
	Twitter Tips https://www.sfecich.com/14	
Monday	3 Lies Blog https://www.sfecich.com/post/3-lies-preservice-teachers-believe-about-twitter	Connect with the community through Introduction, Post and Reply.
Tuesday	Reasons Why Blog https://www.sfecich.com/post/3-reasons-why-a-pln-is-important-for-a-preservice-teacher	Generate a Question for the Community
Wednesday	How To Slay a Twitter Chat https://www.sfecich.com/post/how-to-slay-your-first-twitter-chat	Participate in a Twitter Chat
Thursday	Finding a PLN https://www.sfecich.com/post/teacherlife-finding-a-pln-on-instagram	Contribute a Resource
Friday	Introduction to LinkedIn https://www.sfecich.com/post/your-guide-to-a-lit-linkedin-profile	Identify and share names of professionals and organizations relevant to growing a PLN
	Follow Friday	

The initial step in the challenge is to set up an account on Twitter. This includes a complete bio and picture. The TC may link their digital portfolios here too. The first day of the challenge includes teacher candidates introducing themselves to the community. By introducing themselves to the community of learners they are making connections to other teacher candidates, novice teachers, administrators, and higher-ed faculty from around the world. They also reply to others who are in the challenge connecting outside of their classes. During the second day of the challenge TCs share a question with the community of learning. This is an opportunity to engage in conversation and ask questions to veteran educators, administrators, higher education faculty and peers. As twitter shows we are all better together (Trust, Krutka, & Carpenter, 2016) and we can gain many ideas when we work together to help all students succeed. The third day of the challenge requires participants to engage in some planning ahead. They need to find a Twitter chat to participate in during the week and contribute to the conversation. However, education courses convening at the same time as a Twitter chat may engage in the live chat while together as a group in the physical classroom, addressing the feeling of being an outsider mentioned in Hseih's (2017) study. Although research has been done in specific content areas focusing on specific twitter chats throughout the semester, we decided to give teacher candidates a choice of Twitter chats to participate in based on their own areas of interest within the field of education. During the fourth day of the challenge participants share a favorite resource such as a link to an article, materials, or other educational related content. This is an opportunity for TCs to build their library of resources. The challenge culminates with a follow Friday challenge where TCs share five or more people who support and encourage them on Twitter. This is an opportunity for TCs to validate professionals, organizations, companies, and resources. In addition, TCs may add to their PLNs during this process.

Research Questions

This research study was guided by the following research questions:
RQ1: What types of practices are being implemented within the hashtag #PSTPLN?
RQ2: What is unique about the Tweet content within the hashtag #PSTPLN during COVID-19 (after March 15, 2020)?

Methodology

All posted Twitter tweets were collected using the hashtag #PSTPLN from August 2019 to May 2020. A random sample of 200 tweets from this collection were analyzed after data cleaning – ensuring that the Tweets pertained to education. Open coding was first used to get to know the data, and then search for themes, and finally categorize the Tweets into themes. Four themes were generated in this data set which revealed four types of practice: 1) Teacher Knowledge Construction, 2) Building on another person's ideas, 3) Reference to helpful resources, 4) Providing information on whom to follow on Twitter. For example, for a "retweet", the code RT was used. A RT is when a user is making the conscious decision to put a tweet from another person into their own feed, thereby endorsing and approving its validity to their community. However, additional content that further built on someone's ideas but added their own knowledge (BO) was also evident; this type of data, where the participant builds on additional knowledge was coded as (BO). Thus, data coded as a retweet was examined a second time and coded according to additional factors such as building upon another's idea.

Table 2
Data Analysis Scheme for Coding #PSTPLN Random Sample of Tweets, with Examples

Code	Explanation	Example
(1) Teacher Knowledge Construction (TK)	Tweet used in order to confirm, agree, or promote ideas related to teaching pedagogy	
(2) Build on another person's ideas (BO)	Tweet used to restate and give additional knowledge related to the initial Tweet	
(3) Reference to helpful resources (RR)	Tweet suggesting using resources beyond hashtag. This may also contain personal experience and/or outside resources	
(4) Providing information on whom to follow on Twitter (FF)	Tweets identifying particular people to follow on Twitter. Identifying these people as key people in the field of education	

RESULTS

Initial Findings

Thematic analysis of our random sample of the hashtags #PSTPLN was performed (Braun & Clark 2006). A thematic analysis uncovered the following code densities: (1) teacher education related knowledge, 26%; (2) building on another persons' ideas, 11%; (3) references to helpful resources, 8 %; and (4) providing information on whom to follow on Twitter, 15%. These codes provide evidence to better understand how teacher candidates are utilizing their Twitter PLN. A second deeper iteration of coding revealed that 40% of the Tweets came from experts in the field rather than from teacher candidates thus these were excluded from the chart Table 3.

Table 3
Data Analysis Scheme for Coding #PSTPLN Random Sample of Tweets, with Examples
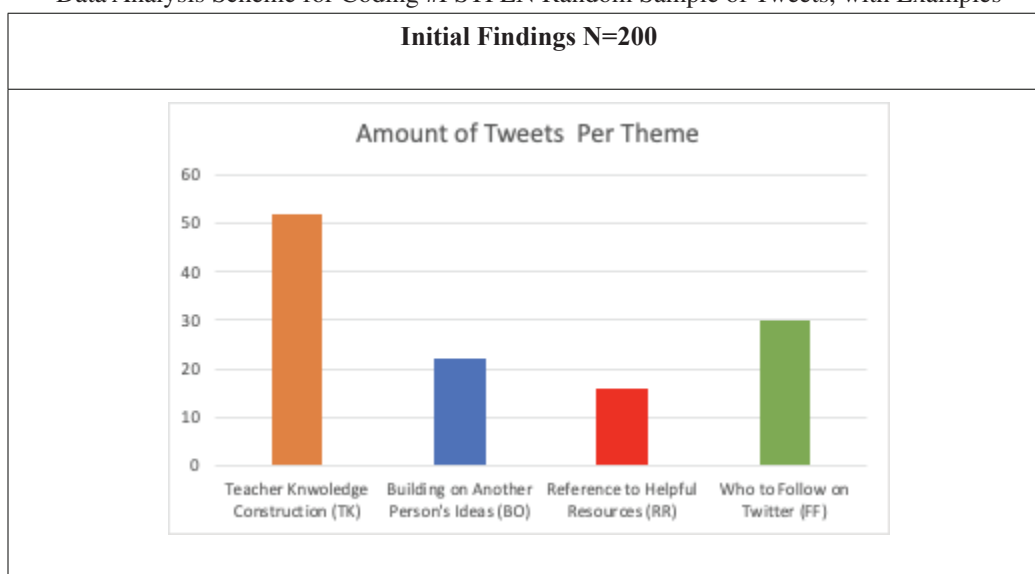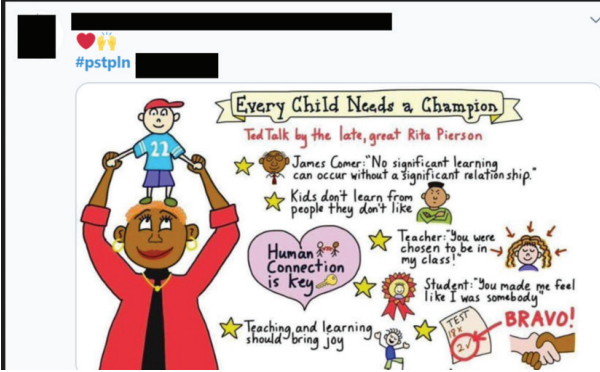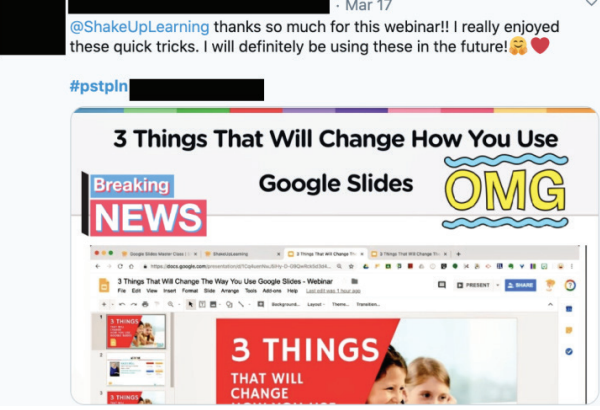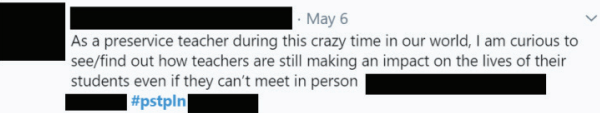
During COVID-19 Findings

Due to the recent pandemic, another iteration of the thematic analysis was done. This particular iteration looked at a random sample of 50 Tweets with the hashtag #PSTPLN from March 15th, 2020 to May 15th, 2020.

Table 4

Data Analysis Scheme for Coding #PSTPLN Random Sample of Tweets, with Examples During COVID-19

Code	Explanation	Example
Building on Quote or Article (BQ)	Tweet used to restate or give additional knowledge to a quote or an article referenced	
Reference to online resources (RO)	Tweet suggesting additional online resources	
Attending Webinars (AW)	Tweet sharing attendance to a webinar to increase professional teacher knowledge	
Posing Questions (PQ)	Tweet posing a question or searching for information	

The thematic analysis of data collected during COVID-19 uncovered new information. The following code densities were uncovered: (1) building on ideas such as quotes or articles, 26%; (2) references to online resources, 48%; (3) attending webinars, 16% (4) seeking information while posing questions, 10%. While teacher candidates continued to build upon ideas posed by others in the field and found helpful resources during COVID-19, they also posed questions to the community and participated in self-selected learning opportunities. By attending webinars and sharing what they learned the teacher candidates are not only adding resources but also validating and endorsing the host of the webinar. By doing so this action demonstrates to the #PSTPLN community that this is a person to add to their PLN. Data also indicates that teacher candidates asked more questions to the community as they were able to observe in real time the results of going from a teaching face to face learning environment to an online learning space.

Table 5
Data Analysis Scheme for Coding #PSTPLN Random Sample of Tweets, with Examples
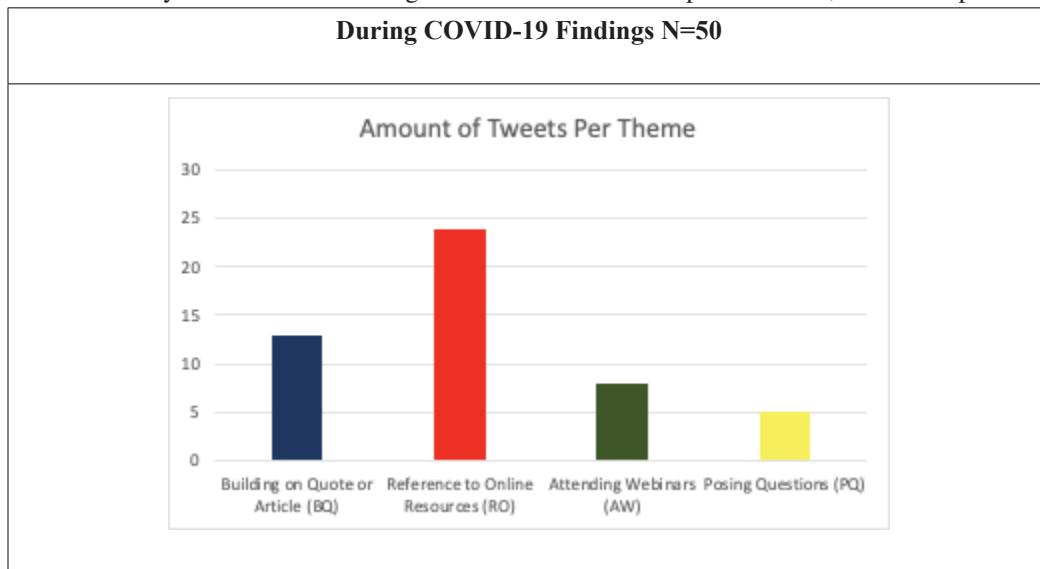
IMPLICATIONS

The PLN formed on Twitter became a valuable tool to understand the evolving nature of how teacher candidates accessed, made sense of, and interacted with diverse information outlets in the digital age where social media has a prominent influence on one's own understanding of teaching and learning (Carpenter & Krutka, 2015). The designed learning environment of Twitter allowed users to learn through online interactions and make sense of real-world educational situations. Because teacher candidates had already begun developing their PLN within the space of social media, they had immediate access to what was happening in the classroom and a space to observe practicing teachers' reaction and response to the pivot in the classroom. We found that when education pivoted from face to face learning to online learning these participants were able to directly observe teachers in the real-world learning from this new space. During COVID-19 teacher candidates were still collecting and sharing resources with the community but they also asked more questions and sought out learning opportunities.

As research suggests, teacher candidates need support, scaffolded instruction, and affirmation while engaging with professionals in the field (Kearney, Maher, & Pham, 2019; Krutka & Damico, 2020). We found in the data clear connections between the scaffolds provided during each day of the challenge. We found that the tweets coded were directly related to the structured activities provided by the challenge. They also demonstrated that they used this community after the Twitter challenge was completed, during COVID-19. By providing teacher candidates with a PLN prior to the COVID-19 they were able to continue their learning within the community to gain resources, ask questions, and participate in self-directed learning opportunities.

Offering information and encouragement through the use of podcasts and blogs generated by both novice and seasoned professionals as pre-teaching for an event such as a Twitter Challenge assists in breaking barriers and altering at-

titudes about the use of social media for professional learning. The pre-teaching resources are intentionally selected for their relational style and conversational tone. While recent research (Krutka & Damico, 2020) suggests requiring teacher candidates to use Twitter as part of assigned coursework may lead to brief engagement with indifference, the use of scaffolding and student choice demonstrates more authentic participation. Additionally, data indicates teacher candidates continue to leverage this platform for building their PLN beyond the required classroom assignment.
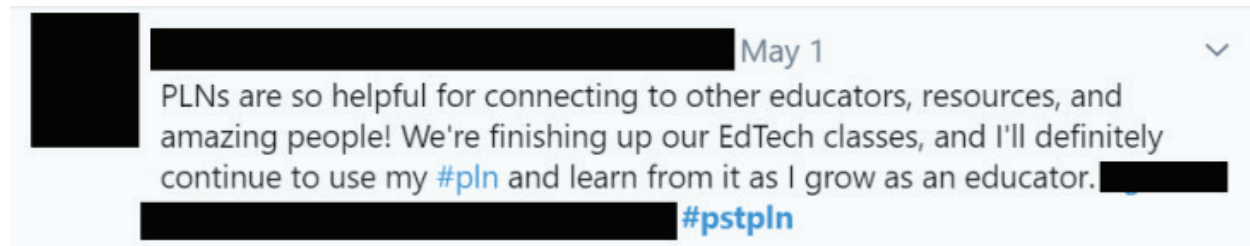
Figure 1. Sample Tweet from a teacher candidate about the power of a PLN during COVID-19.

This practical and relational professional development activity is a tool that may be used in any educator preparation program. Harnessing social networking technology led our teacher candidates to inexpensive, timely, and realistic practices for on-going PD. In terms of the applicability of the #PSTPLN Twitter Challenge itself as a resource, teacher candidates collaboratively tackled real world educational situations encountered in their P12 schools. Twitter provides teacher candidates with immediate, on demand professional development which is not possible with traditional PD. Additionally, the PLN digital footprint offers our candidates a professional presence, which as they are searching for employment, may offer more connections hence making them more employable.

FUTURE RESEARCH

Twitter can fill a gap within the PD community – particularly when educators must pivot their practice. This research targeted intentional scaffolding for the teacher candidates by integrating resources that were approachable for these participants. The relational style of the pre-teaching materials combined with the tasks to engage within the social media environment complement one another as a support for learning. Future research could expand on this type of social learning for developing a PLN. Particularly by including a wider novice teacher presence among the teacher candidates to develop amiable relationships, a sense of belonging, and non-threatening platform for asking questions. Further research can be done through follow up with first year teachers and their use of a PLN during their career.

Twitter is a tool that teacher educators, teacher candidates, and researchers can leverage as a cost effective and quality PD. It allows for self-directed learning, where meaningful professional relationships may develop naturally among teachers (Visser, Evering, & Barrett, 2014). In addition, faculty can support teacher candidates through a PLN. Lastly, it would be interesting to see if the Twitter challenge could be translated to the Instagram platform. Understanding how Instagram is being used for future and new teachers could inform how connections are being made between teacher candidates, novice teachers, and practicing educators.

This Twitter challenge provided teacher candidates a space to share practical and professional pedagogical advice, resources, and connections. During COVID-19 teacher candidates collected and shared resources with the community and they asked questions and sought out learning opportunities. Twitter provided teacher candidates with on demand professional development.

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Note

Throughout the manuscript, we crossed out names and Twitter handles of the showcased Tweets, as well as the common course hashtag, in an effort to help protect their anonymity.

Social Media Collaborative Spaces: Building Bridges to Just-in-Time Training

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The impact of COVID-19 on instructional delivery brought to the forefront gaps that exist in the knowledge and skills of K-12 education stakeholders (e.g. pre-service/in-service teachers, campus/district administrators, technology specialists, curriculum specialists, students, parents). Social media offers an interactive space to not only share ideas but to extend and disseminate ideas; bridging gaps in knowledge and skills now acerbated by isolation created during school closures. However, these spaces do not always provide developmentally appropriate evidence-based practices and information. Addressing stakeholders' need to access evidence-based resources that provide just-in-time training is essential if we are to be responsive to educational needs. This chapter provides insights into evidence-based social media collaborative spaces (EBSMCSs) that could potentially build bridges to much needed just-in-time training. Strategies for design, development, implementation, and evaluation of EBSMCSs will be shared.

Keywords: social media, just-in-time training, collaborative spaces, education preparation, evidence-based practice, professional development, online learning.

INTRODUCTION

School districts have historically discouraged social media use. While, social media tools provide effective information sources for pre-service/in-service teachers as they navigate educational programs and classrooms (Forte, Humphries, & Park, 2012), there are substantiated concerns regarding information validity and evidence-based foundations (Bode & Vraga, 2015). Facebook, Pinterest, Instagram, Twitter, and YouTube are the most popular tools, offering access to resources, lesson plans, activities, management strategies, and a range of instructional ideas (Murphy & Savvy Social Marketing, 2019). However, to ensure fidelity of implementation it is critical resources be evidence-based; removing the burden of value determination from stakeholders (Lastrapes & Mooney, in press). During COVID-19, overnight teachers found themselves diving into the uncharted world of online instruction; teaching outside classroom walls. No longer were they next door or on the same campus as fellow teachers and mentors; creating a sense of isolation. Research indicates separation and isolation negatively impact confidence and create a sense of pending failure; resulting in unsatisfactory performance (Golden, Veiga, & Dino, 2008; Nehmeh & Kelly, 2018). Isolation and resulting performance gaps could be bridged using just-in-time training through evidence-based social media collaborative spaces (EBSMCSs).

INNOVATION

Addressing barriers to social media that supports just-in-time learning needs of pre-service/in-service teachers could be overcome by establishing EBSMCSs in the newly expanded classroom environment, created because of COVID-19 safety measures. Providing just-in-time training could potentially address gaps in skills and knowledge due to preparation, changes in practices/policies, and diversity of need. Additionally, results from exploration of EBSMCs use could inform best practices for just-in-time training across a range of populations and industries. Providing evidence-based interventions could positively influence innovation adoption and implementation through stronger knowledge base development and improved self-efficacy.

EBSMCSs are best illustrated as integrative and interactive spaces, inclusive of evidence-based best practices and resources collaboratively designed and developed to meet specialized needs of identified populations (Table1). EBSMCSs provide stakeholders with a reliable and validated source of just-in-time training, resources, and information. EBSMCSs address the disconnect that exists between educational theory and practice by ascertaining need, building interventions, evaluating outcomes, and as a result identifying evidence-based resources that are responsive to targeted needs. In EBSMCSs, university faculty with expertise in areas of instructional support (e.g. pedagogy, classroom management, special education, instructional design), content (e.g. math, science, social studies, language arts, art, music), logistics (delivery platforms, hardware, software, apps) are partnered with district faculty from each area of instructional support, content, and logistics to collaboratively build training and resources needed to meet identified knowledge and skills gaps. In this chapter the population under study is stakeholders impacted by COVID-19, who have identified needs for just-in-time training to transition from a traditional classroom setting to a fully online learning environment.

Table 1
Examples of EBSMCSs that are population specific and expert developed

Social Media	Example	URL
Facebook	We Teach Sped	https://www.facebook.com/weteachsped
Pinterest	Panther Pinners	https://www.pinterest.com/pantherpinners/
Twitter	NCTM Illuminations	https://twitter.com/NCTMIllum
YouTube	It's Ok to be Smart	https://www.youtube.com/itsokaytobesmart%C2%A0

Educating campus and district stakeholders (e.g. pre-service/in-service teachers; campus and district administrators; technology specialists; curriculum specialists, students, parents) supports development of EBSMCSs that meet needs of all stakeholders (Joseph & Reigeluth, 2010). EBSMCSs offer an interactive space to not only share ideas but to extend and disseminate ideas; bridging gaps in knowledge and skills now acerbated by isolation created during school closures. Building EBSMCSs with support of educational experts ensures dissemination of evidence-based practices, information, and resources. EBSMCSs afford campuses and districts opportunities to test social media use while exploring security and safety concerns. Pre-service/inservice teachers gain access to needed support, administrators increase awareness and skills in social media resources use, students (today's experts) share insights while navigating new learning spaces, technology specialists assist in tool exploration and validation, parents gain confidence accessing the network of experts and evidence-based resources needed to support their learner's education.

While COVID-19 brought to the forefront gaps that exist in the knowledge and skills of K-12 education stakeholders, lessons learned could inform best practices for just-in-time training across all education preparation programs (e.g. teacher, administrator, technology and curriculum specialists) by ensuring supplemental materials accessed through just-in-time learning are evidence-based and aligned to best-practices. Providing just-in-time training could potentially address gaps in skills and knowledge due to preparation, changes in practices/policies, and diversity of need. Providing evidence-based interventions could positively influence innovation adoption and implementation through stronger knowledge base development and improved self-efficacy.

RESULTS

Historically evidence-based practices have been linked to the fields of medicine and special education. However, evidence-based practices have become more popular in the field of education to address the need to ensure appropriate models and resources are identified and implemented (Odom, et al., 2005). Results of EBSMCSs development and testing could provide insights in how to improve the preparedness of pre-service/in-service teachers through access to resources that are both responsive and evidence-based. Access to just-in-time training could potentially bridge gaps which exist for a variety of stakeholders (Kopp & Burkle, 2010). Whether it is a pre-service teacher navigating their educational pathway, a classroom teacher seeking information to improve design, development, and delivery of instructional materials, or a parent struggling to supplement the educational needs of their home bound learner, an EBSMCSs, supported by experts and responsive to specific needs, could be a viable solution. Results could provide critical insight into how EBSMCSs could be developed, implemented, and sustained. Identifying sustainable solutions for providing just-in-time training could be instrumental in how educational institutions address critical instructional needs as they arise in the future (Sampson & Karagiannidis, 2002).

IMPLICATIONS

Creating an EBSMCs is best accomplished using an agile processing model for design, develop, and testing (Fowler & Highsmith, 2001). The agile framework supports large project completion, like EBSMCSs by separating elements into smaller chunks that can be worked on concurrently (Krebs, 2008). Agile allows teams to return to all stages of development as often as needed until they are ready for full scale implementation; ensuring full functionality and validity of the overall project (Dahlby, 2004). (Figure 1).
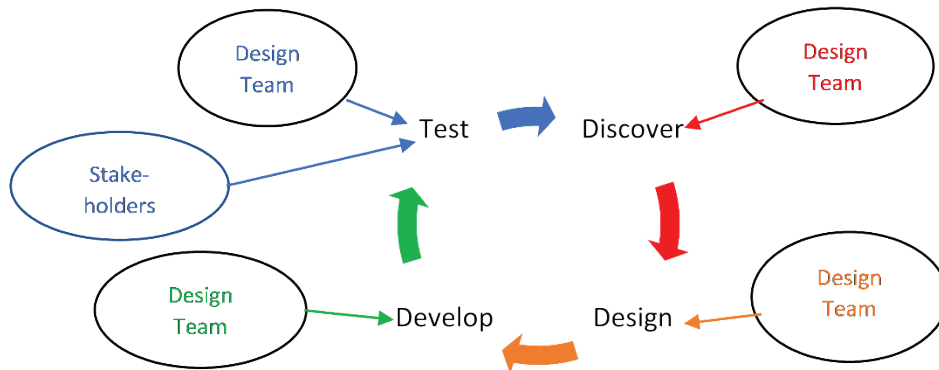
Figure 1. Agile Development Cycle

University faculty with expertise in areas of instructional support (e.g. pedagogy, classroom management, special education, instructional design), content (e.g. math, science, social studies, language arts, art, music), logistics (delivery platforms, hardware, software, apps) should be partnered with district faculty in each area of instructional support, content, and logistics to build collaborative design teams. Using online surveys and interviews teams will be able to conduct needs assessments to identify gaps in skills and knowledge that "bubbled up" during COVID-19. Once gaps are identified teams will develop the evidence-based support materials needed to provide just-in-time training. The agile method allows each team to develop small components that can be piloted for evaluation; returning feedback to improve development processes. Frequent collaborative meetings with each team in cycles (sprints) allow teams to assess processes and identify next steps until project completion. (Figure 2).
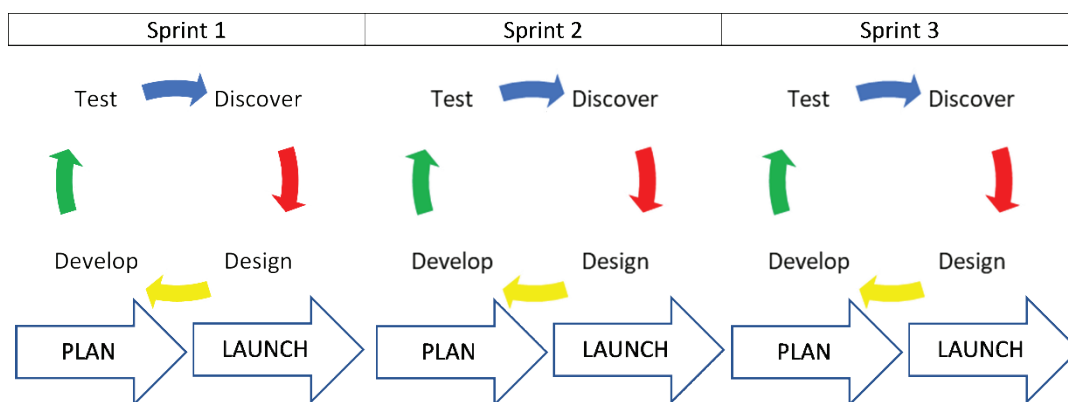
Figure 2. Sprint Cycles

Exploring of EBSMCSs through a design-based methodology Brown (1992) and Collins (1992) offers researchers insight into the potential impact of EBSMCSs on all stakeholders. In design-based research "researchers manage research processes in collaboration with participants, design and implement interventions systematically to refine and improve initial designs, and ultimately seek to advance both pragmatic and theoretical aims affecting practice (Wang & Hannafin, 2005, p. 5). The research will be focused on self-efficacy and perceptions of stakeholders during development and piloting of EBSMCSs.

Data should be collected in two phases. Phase I data should be collected through surveys and interviews during the Discover phase of EBSMCSs creation to inform development. Phase II data should be collected at the end of each Test phase to gauge perceived impact of EBSMCSs on stakeholders' self-efficacy and the perceived value of EBSMCSs. Phase II data should be collected using retrospective surveys, discussions forums, and interviews. Retrospective surveys have been found more reliable than traditional pre-post when participants' perceived knowledge is either invalid or they do not yet know enough to provide an accurate response (Davis, 2003; Pratt, McGuigan, & Katzev, 2000). Additionally, retrospective surveys have been found to provide a "more sensitive and more valid measure" (Skeff, Bergen, & Stratos, 1992, p. 350) during short term interventions when the content is more clearly understood at the conclusion of the intervention (Marshall, Higginbotham, Harris, & Lee, 2007; Rockwell & Kohn, 1989;).

FUTURE RESEARCH

A university in the southwest region of the United States is seeking district partners to create EBSMCSs to build bridges to much needed just-in-time training. Evidence-based instructional practices, support tools, classroom management, and pedagogical strategies will be included to support instructional needs of all stakeholders. In EBSMCSs, preservice/inservice teachers would have access to the support they need, administrators could increase awareness and skills in use of social media, students (today's experts) would share insights while navigating their new learning spaces, technology specialists could assist in tool exploration and validation, while parents would have access to a network of experts and resources needed to support their learner's education. Additionally, future research could examine impact of EBSMCSs by content (e.g. math, science, humanities), teacher (e.g. general education, special education, parent), and grade level (e.g. elementary, intermediate, secondary). Finally, future research could examine if EBSMCSs use increases when schools go return to brick-and-mortar instructional delivery. Replication research will be extended to multiple districts, state-wide, nationally, and globally to build stronger and more fully developed resources. Extended areas of study could include populations where training needs are both immediate and essential for success (e.g. n higher education, medical fields, business/industry, high risk).

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Alternative Field Experiences in Pre-Service Teacher Education

Transitioning to Online Student Teaching:
Factors Impacting Elementary Education Student Teachers

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Student teaching is the seminal component of teacher preparation and was severely interrupted and altered due to the COVID-19 pandemic. In a short time, student teaching at Missouri State University was transformed into an on-line experience with repercussions affecting not only the interaction with teachers, students, and supervisors, but also university and state certification requirements. This chapter will share experiences of transitioning student teachers to an online learning, teaching, and mentoring approach; methods to sustain teaching and learning best practices, as well as, lessons learned by student teaching supervisors, district officials, and university coordinators to ensure the successful completion of student teaching.

INTRODUCTION

Student teaching is one of the most important components of preservice teacher preparation programs (Ronfeldt, Schwartz, & Jacob, 2014). During the third week of March 2020, the COVID-19 pandemic drastically altered two student teaching experiences at Missouri State University. The integrity and inclusiveness of this final teacher preparation experience for elementary education student teachers was impacted and altered in several ways. This chapter will discuss the transition from an in-school student teaching experience to an online student teaching approach (Al-Awidi & Alghazo, 2012; Hixon & So, 2009; Pearcy, 2014) and share how two teacher preparation programs maintained a high-quality educational experience for their student teachers (Cornu & Ewing, 2008; Chen, Hendricks & Archibald, 2011).

INNOVATION

Using a social constructivist approach (Creswell & Poth, 2018), data was collected through examining documents, observing behavior through online formats and discussions with student teachers, student teaching supervisors, university and state-wide officials. Credibility was established by engaging the student teaching coordinators of both student teaching programs as conversational partners in the data collection process. An emergent design was used to examine and compare outcomes between both student teaching programs that impacted student teachers throughout the organization and examination of results (Lincoln & Guba, 1985).

The 90 elementary education student teachers that were drastically impacted by the changes to their student teaching experience were in one of two student teaching programs in the College of Education of Missouri State University. The first student teaching program consisted of 72 elementary undergraduate students in a traditional student teaching

experience (Greenberg, Pomerance & Walsh, 2011). Student teachers in this traditional, one semester, five day a week student teaching experience were placed in over 25 school districts, including in-area and out-of-area placements. The second student teaching program, the Internship Academy (Tipton & Cunningham, 2018), consisted of 25 undergraduate elementary student teachers completing a two-semester student teaching experience while still completing coursework during their first semester. These student teachers were placed in five in-area and two out-of-area school districts, in which co-teaching was the recommended format for teaching and learning.

Several research questions guided this work: What changes before and after the COVID-19 outbreak impacted both of these student teaching programs and how were maintaining teaching best practices and communication between the student teachers and schools sustained? Finally, what lessons were learned by student teaching supervisors, district officials and university coordinators to ensure the successful completion of each student teacher's culminating semester?

Changes to each student teaching experience originated not only from school districts, but also from the university, department, assessment offices, and the state certification office. Some of these changes were altered several times, making increased communication a necessity to ensure student teachers were properly updated on information that affected their student teaching experience, including graduation and certification requirements. The ultimate goal was to ensure student teachers received the best possible student teaching experience under these unprecedented educational conditions.

RESULTS

Transitioning to online student teaching for both programs had varying results and changes, such as (a) state-mandated certification, (b) the choice to continue student teaching, (c) communication, (d) lesson delivery, (e) mode of instruction, and (f) classroom management. The outcomes for student teachers changed because of the pandemic (see Table 1).

Table 1
Before and After Pandemic-based Outcomes for Student Teachers

Before COVID-19 Outbreak	During COVID-19 Outbreak
Passing of *two* required state-mandated certification tests.	*Waiver of two* required state-mandated certification tests due to the COVID-19 pandemic.
All student teachers reported to their schools in-person.	Student teachers abruptly had to choose to either continue student teaching online or to complete their student teaching immediately.
Communication with cooperating teachers and university supervisors occurred face-to-face, by email, phone, and text messaging.	Face-to-face communication was replaced by video conferencing through Zoom.
Lesson planning and delivery occurred in small group, face-to-face meetings.	Lesson planning and delivery occurred via email, video conferencing and learning management system platforms
Mode of instruction occurred in small groups or whole class through in-person instruction.	Mode of instruction occurred in small groups or whole classes through video conferencing on Zoom or Google Hangouts.
Instruction included the use of hands-on manipulatives and paper-based texts.	Instruction included a blended learning environment, such as online versions of manipulatives and ebooks (Oliver & Stallings, 2014).
Classroom management occurred face-to-face in a physical classroom.	Classroom management occurred online via a virtual classroom.

Besides outcomes, the daily life and expectations for student teachers also underwent a transformation. Student teachers described school-specific student teaching changes that were also immediate and varied (See Table 2).

Table 2

School-Specific Student Teaching Changes

1	Each *student teaching experience varied greatly*, depending on district and school changes. This required supervisors and coordinators to *differentiate required course expectations and outcomes for the student teaching*.
2	The role of the student teacher changed dramatically from co-teacher to *teaching assistant or less*.
3	Learning the new online teaching format. This was a *"build it as you go" process* for both the cooperating teacher and student teacher.
4	Providing instruction and feedback to students in schools not using an online format. Several rural *homes did not have the infrastructure in place* to receive the Internet, so schools had to deliver physical packets to students, such as using school buses to drop off the packets.
5	Understanding *student teachers, cooperating teachers, and classroom students' social/emotional needs* and how to cope with *increased stress and anxiety*.

Throughout the adjustment to maintain best teaching practices and continue effective communication for these student teachers, many external factors influenced student teacher's decisions and choices based on what was in the realm of their control. Table 3 provides examples of how best practices in teaching (Zemelman, Daniels & Hyde, 2012) for student teachers were maintained and how communication between the student teachers, schools and universities were continued. By identifying the best teaching practices and communication efforts, we can look to make program modifications moving forward.

Table 3

Maintaining Best Teaching/Learning Practices and Communication Skills

Maintaining Best Teaching/Learning Practices	**Continue Effective Communication Skills**
Student teachers worked with their cooperating teacher *to define their new role* as a student teacher.	Having *scheduled daily and/or weekly Zoom/Google Hangout sessions* or phone calls about online changes in the classroom.
Student teachers *developed flexibility in their teaching roles and responsibilities*.	Using Google docs or other interactive online tools to *share lesson plans, instructional strategies or ways to communicate with parents*, especially those without Internet or online resources.
Student teachers *became leaders using online teaching practices* for different content areas; they implemented online instructional tools for students and often supported classroom teachers with tools, as well.	Student teachers had to be vigilant to *check their university emails for updates and changes* that directly impacted their student teaching.
Student teachers *maintained partnerships with university and school connections* to support moving theory into practice (Zeichner, 2002) with both content and technological pedagogy.	University coordinators *coached student teachers in one-on-one sessions* to help navigate the changes and uncertainty.
Student teachers *prioritized meeting the basic needs of students* before focusing on the academic side of learning (Boogren, 2018).	There needs to be an *infrastructure in place for communication* and a plan for navigating situations when the university and schools put out conflicting information.

IMPLICATIONS

Student teaching placements in the community must be sensitive to the technology resources available to both student teachers and elementary classroom students. Access to adequate online devices and data is not universal. Alternate plans should be considered to deliver materials and information for those with inadequate technology resources. When a student teaching placement goes through a sudden, fundamental change, flexibility is required as schools and universities adjust to the shift differently. Sensitivity to the needs of student teachers is imperative and may require additional flexibility in timelines of required expectations.

Several implications resulted from adapting to this new online format that were shared by student teachers, supervisors and university personnel. Student teachers learned to identify related factors, such as classroom and certification

issues, within their control and those factors not in their control. For example, many student teachers wanted to continue working with their cooperating teacher but were not able because their school/district decided to end student teaching for the remainder of the year. Second, student teachers learned to be flexible as their roles and expectations changed within this new online format. Most student teachers went from being in full control of classroom teaching to being an assistant or support to the cooperating teacher. Third, increased two-way communication was extremely vital for student teachers and key stakeholders to ensure required information was quickly received. When stakes are high for communicating important certification, assessment and health/safety information, it is imperative that all stakeholders are consistently informed. Communication has always been an important factor in teaching, but the epidemic has heightened its importance. In addition, student teachers realized that basic needs of their elementary classroom students had to be met before online learning could begin. Students needed to feel safe, be fed and feel loved (Shaughnessy, Moffitt, & Cordova, 2018; Le Brocque, De Young, Montague, & Pocock, 2016) before engaging in learning. A further implication for both student teaching programs was the need to develop policy and procedures to address future health crisis situations (Holzweiss, & Walker, 2018). A final implication was having to rely on the strengths of our two student teaching experiences to effectively and efficiently communicate information to our student teachers. For example, the communication structure of the Internship Academy had established personalized and two-way communication pathways in place, but the traditional student teaching program had a more formalized system to disseminate information (Clement, 2019). Moving forward, the two program coordinators seek to collaborate and share procedures in order to strengthen both programs.

Adapting to an online student teaching experience is a new and ever-changing educational landscape that schools and universities are still learning to effectively navigate (Dursun, 2019). This chapter described initial factors and changes that forced College of Education elementary student teachers at Missouri State University to transition to an online student teaching format.

FUTURE RESEARCH

Student teaching is designed to be an in-person, face-to-face learning, teaching and mentoring experience (Chen, Hendricks & Archibald, 2011; Greenberg, Pomerance & Walsh, 2011; Ronfeldt, Schwartz, & Jacob, 2014). If student teaching continues to include a large online component, can the high standards and goals of student teaching be maintained? Increased research is needed to better understand the potential long-lasting effects of online student teaching. Teacher preparation programs need research and guidance on how to support student teachers in alternate formats while still maintaining high standards and best practices. Due to these unpresented times in our schools and university education programs, long lasting impacts will be felt by the teaching profession and may affect student achievement for years to come. Educational researchers have a unique opportunity to contribute to the growth, revision, and improvement of education programs and teaching best practices for this new and still changing learning and teaching environment.

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Virtually Remote: How Interrupted Internships Continued in a Virtual Classroom

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PK-12 public schools and universities moved to remote learning in March 2020 due to the arrival of the CO-VID-19 virus in the United States. This left University of Central Florida (UCF) education students unable to complete their final internships for the Spring 2020 semester, as well as those who needed to earn their ESOL endorsement. Nineteen final-internship students were able to complete their graduation requirements via an alternative plan of participating in simulated teaching presentations with three English-language learner avatars in a virtual classroom.

INTRODUCTION

Teacher education programs at the University of Central Florida (UCF) prepare candidates to support English learners' (EL) academic achievement. Because Central Florida is rich in a diverse PK-12 student population, most student teachers are placed in classrooms with one or more ELs. However, in rural areas bordering the greater Orlando area, student teachers who complete their internships in classrooms without ELs and must add a two-week experience with ELs at the end of the semester.

As the Spring 2020 semester progressed, plans were being made for 19 of the 121 student teachers to complete these special-placement internships. In week eight, however, the internships came to an abrupt halt due to COVID-19 and the closure of Central Florida schools for the remainder of the school year. Faculty and administrators came together to develop a rapid response to this unprecedented need using a virtual classroom technology with which many of the faculty had previously conducted research. In addition to its availability, the use of technology in teacher education programs has been shown to positively supplement more traditional methods of teacher preparation, such as internships, practicums, and field experiences (Hixon & So, 2009; Hughes et al., 2005; Zibit & Gibson, 2005).

INNOVATION

Completing in-person internship classroom observations for teacher candidates (TCs) was challenging as no alternative option was in place. The first step was to determine which behaviors TCs needed to present during their internship observations in order to graduate (de Jong & Harper, 2005). It was determined that the digital badges awarded by the Micro-Credentialing of English Learner Teacher Skills program (MELTS, funded by the Office of English Language Acquisition, U.S. Department of Education) had not only related skills that corresponded with UCF's and the State of Florida's ESOL endorsement requirements, but the program had also moved all existing in-person digital badging presentations to Skype for the remainder of the Spring 2020 semester due to UCF's campus closing amid COVID-19. This availability enabled an opportunity for internship students who needed EL experience to be evaluated on their EL performance in a simulated classroom due to real-life classrooms being closed.

Teacher candidates prepared a five-minute virtual classroom presentation by completing two online modules: 1) Leading a questioning sequence for English learners at beginning, intermediate, and advanced levels of English proficiency (Nutta et al., 2018); and 2) Differentiating whole-class instruction of a procedure for English learners in the class-

room. Each module included a short reading on the topic, a video of a master teacher demonstrating the skill, a quiz of the readings and video, a skill-planning template, and a reflection. They then used the online scheduling portal to reserve a date and time to present in a virtual classroom environment.

Students were called via Skype at their scheduled appointment time where they presented Skill 1 (leveled questioning for Levels 1, 3, and 5 ELs) first. The selected virtual classroom configuration included five students, two of whom were native English-speaking students, as well as one English learner each at the beginning, intermediate, and advanced levels of English proficiency. They received both positive and constructive feedback, and then moved on to Skill 2 (teaching a classroom procedure with leveled questioning). Two seasoned evaluators observed the presentations with a MELTS skill coaching form as well as a MELTS skill holistic badging form to guide the students and provide both in-the-moment support and summative feedback to them. Once each student completed both skills, their results were communicated to their internship supervisors.

RESULTS

Internship students were both ready and rehearsed for their two skill presentations. Only two of the 20 were unprepared for their scheduled skill session appointments. The students who had no previous virtual classroom experience expressed their nervousness with working with the platform, and a few conveyed that they had not utilized Skype previously. Overall, the internship students were professional and successful. Although they were interacting with avatars, they displayed competent and capable "teacher personas" in the areas of classroom management, leveled questioning of varying levels of avatar English language proficiency, and appropriate follow-up questioning and presentation adaptation of their language and gestures for ELs. Internship students also quickly applied both positive and constructive feedback to their next skill presentation.

IMPLICATIONS

Although it is not recommended that simulated teaching practices replace internships completely, there are places where replication can be valuable. Institutes which have a limited number of ELs for teacher candidates to work with during internship may benefit from this experience. We reviewed available options that would allow the evaluation of the interns' performance with ELs, and found that UCF's MELTS modules allowed for observation of two basic areas: leveled questioning of differing levels of EL proficiency and classroom management.

It is possible for any education degree program to replicate this process with the use of Skype and a classroom component. Our process utilized the simulated virtual classroom TeachLivE, but this classroom component can also be accomplished via micro-teaching. This process requires:

1. An EL-specific module available to teacher candidates (we used UCF's MELTS Skills 1 [leveled questioning] and 2 [teaching a classroom procedure]; more information about the modules can be viewed at our project website: http://ccie.ucf.edu/melts),
2. A coach to give feedback to the teacher candidate and an evaluator (this can be the same person with appropriate training),
3. Coaching (see Appendix A) and evaluation (see Appendix B) forms,
4. A simulated classroom OR a micro-teach session via Skype, and
5. A teacher candidate with Skype

High-technology simulations using a virtual classroom are an effective means of giving teacher candidates practice with new skills they are learning in their teacher preparation courses (Dede et al., 2005). However, if funding for teaching simulations is not available, a less-costly alternative would be to use a traditional micro-teach experience (Amobi, 2005; Cruickshank et al., 1996). This low-tech approach does require upfront training for coaches and/or participants who portray the ELs and EL-specific behavior. For micro-teaching, we recommend having pre-made cue cards and a bank of common phrases and responses to accurately portray the different levels of English proficiency. These phrases would include grammatical and pronunciation errors typical to beginning- and intermediate-level ELs that can be replicated during micro-teaching sessions. A further option is to have a combination of micro-teaching and virtual classroom simulation, which is both flexible and cost-effective (Diana, 2013).

The teacher candidates need to familiarize themselves with the content as well as understand the professional behaviors they need to model during their five-minute presentation to the virtual or micro-teach classroom; this can be done through any model that sets specific expectations of the teacher candidate. If the teacher candidate does not meet the minimum performance standards with ELs, another session can be scheduled. Education programs can tailor the requirements of the module and presentation session as needed to meet their university's graduation and program requirements.

Providing ample experiences for teacher candidates to work with ELs is imperative for their growth as future teachers of ELs. Moreover, if an institute has an abundance of ELs in its surrounding districts, this experience creates an opportunity for teacher candidates to practice EL-specific skills prior to working with actual students (Dieker et al., 2014; Loureiro & Bettencourt, 2011).

FUTURE RESEARCH

While this process was easily adapted to the internship students' graduation requirements, we are exploring areas to include other PK-12 state requirements for ELs such as ESOL and reading endorsements to be completed via this platform, and are looking at ways to align them with other states' ESOL standards as well. Additionally, we are researching long-term use of the MELTS skills by embedding them into content-area courses beyond the elementary education level, and also into other university-level degree programs (e.g., physics, counseling, medical/nursing, etc.). We will explore recommending this process for teacher candidates who have no EL experience or who have had poor classroom observations during their internships; it could also be a tool for in-service teachers who need support in working with ELs. Finally, utilizing virtual presentations can bridge in-service teachers' in-class experiences with online teaching, and a potential area of examination with this population is coaching them virtually and improving their self-efficacy with ELs while teaching remotely. Working cohesively with teacher candidates, internship coordinators, and other faculty involved is important in reaching EL students successfully, especially in remote-teaching situations.

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APPENDIX A

Skill 1 (Leveled Questioning of an EL) Coaching Form
Practice Coaching Feedback Form — SKILL 1

Student Name		
Skill 1 Preparation	**YES**	**NO**
Brought leveled questions for all three EL proficiency levels		
Presentation	**YES**	**NO**
Engaged all ELs		
Enunciated clearly and spoke at a comprehensible, appropriate pace for Levels 1, 3, and 5		
Interacted with visuals and props		
Used gestures and movements		
Allowed appropriate wait time for Levels 1 & 3 ELs to respond		
Rephrased or used nonverbal support when necessary		
Skill 1 Performance	**YES**	**NO**
Asked level-appropriate questions		
Responded appropriately to ELs' answers		
Asked follow-up leveled questions		

Feedback Notes:

Skill 2 (Teaching a Classroom Procedure) Holistic Badging Form*

0—Below	1—At	2—Above	3—Outstanding
Spoke fast with no evidence of adjustment to students' proficiency levels.	Spoke clearly and comprehensibly occasionally adjusting to students' proficiency levels (**one time per level**).	Spoke clearly and comprehensibly, occasionally adjusting to students' proficiency levels (**two times per level**).	Spoke clearly and comprehensibly, **frequently adjusting** to students' proficiency.
No evidence of checking for EL student understanding.	Checked understanding from ELs **at least one time per level**.	Checked understanding from ELs by following up with level-appropriate questions **once**.	Checked understanding from ELs by following up with level-appropriate questions **multiple times**.
No evidence of introducing and teaching the procedure in a step-by-step manner.	Introduced and taught the procedure in a step-by-step manner, including the use of intonation and facial expressions.	Introduced and taught the procedure to ELs **by attending to the needs of ELs at Level 1 and Level 3,** including the use of intonation and facial expressions.	Introduced and taught the procedure to ELs **by attending to the needs of ELs at Level 1, Level 3, and Level 5,** including the use of intonation and facial expressions.
No evidence of modeling procedure.	Modeled procedure by attending to the needs of **at least one EL.**	Modeled procedure by attending to the needs of ELs **at Levels 1 and 3.**	Modeled procedure by attending to the needs of ELs **at Level 1, 3, and 5**.
Did not use visuals or props at all.	Used appropriate visuals and props at least **once**.	Used appropriate visuals and props meaningfully to help students at different proficiency levels with comprehension of language **a few times**.	**Frequently** used appropriate visuals and props meaningfully to help students at different proficiency levels with comprehension **and production of language.**
No gestures used during session.	Used **minimal gestures and movements** to link language and content.	Used gestures and movements clearly linking language and content in consideration of language proficiency levels **a few times.**	**Frequently** used gestures and movements linking language and content in consideration of language proficiency levels.

*TCs needed to attain at least a score of 1 = At to meet minimum Internship II requirements for graduation.

Digital Sponsorship of Pre-Service Teacher Interns During COVID-19

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In response to the COVID-19 global pandemic, the faculty within the Teacher Quality Partnerships (TQP) project at the University of Central Florida (UCF) collaboratively mobilized to ensure preservice teachers (PSTs) continued internship experiences to demonstrate educator competencies with minimal interruption. Innovative use of technology and social media by school-based, professors-in-residence (PIRs) provided PSTs equitable access to teacher preparation content, resources, and coaching. The use of technology promoted engagement, provided continual connection and feedback, and developed collective resiliency for PSTs. Despite the immediate transition to remote learning due to school closures, initial outcomes included 100% internship completion, 30% of senior PSTs hired thus far, and increased PST engagement and interaction within the program and school site communities.

Keywords: teacher preparation, pre-service teachers, technology, social media, clinical experiences, remote learning, sponsorship, mentoring, coaching

INTRODUCTION

The coaching and mentorship of pre-service teachers (PSTs) during clinical preparation within high-needs schools (HNS) is critical to improve pedagogical skills and instructional practices to effectively teach students with diverse learning needs (Curcio & Adams, 2019; Nagro & deBettencourt, 2017). Faculty at the University of Central Florida (UCF) and the Orange County Public School District (OCPS) co-constructed a teacher preparation model through the Teacher Quality Partnerships (TQP) grant that leverages the role of a school-based, professor-in-residence (PIR) to create a sponsorship model (Johnson & Ridley, 2018; Geesa et al., 2020) of coaching and mentoring. This chapter describes TQP project innovations in leveraging technology and social media to strengthen and enhance the PIR sponsorship of PSTs and support their continuing education and internship experiences after university and school closings due to the COVID-19 pandemic. Sharing this process and initial outcomes contributes to the development of best practices for the realities of remote teaching.

INNOVATION

The PIRs created school-based communities of practice (Knight, 2011), serving as liaisons between the university and partner schools. In the post-COVID response effort, collaboration between faculty, TQP project leaders, and PIRs led to a system of support and delivered resources to facilitate competency fulfillment for PSTs. Faculty engaged in technology-based professional learning (See Table 1) in order to provide a continuum of digital resources to support PSTs. Technology was used as an application for professional learning and coaching, as well as an avenue for building resilience among PSTs. In the early onset of the pandemic, PIRs immediately engaged in e-coaching, virtual instruction, and sustained mentoring with PSTs via traditional platforms such as phone calls, texts; collaborative platforms like Padlet, Flipgrid, and Zoom; and social media platforms such as Twitter, Instagram, and FaceBook to deliver knowledge and expertise in professional competencies (Benedict et al., 2016; Desimone & Garet, 2015). Podcasts related to pedagogy and practice were developed by faculty to support remote learning. PIRs used collaborative tools (e.g., GoogleDocs,

Microsoft Teams) to host virtual mock interviews, write letters of reference, and affirm PSTs during the job navigation process. This active encouragement of career advancement for PSTs sets sponsorship apart from traditional coaching or mentoring (Ang & Ang, 2019; Geesa et al., 2020).

Table 1

Technology Resources to Support Sponsorship of Pre-Service Teacher Interns

Resource	Use	Application Example
GoogleDocs https://www.google.com/docs/about/	Communication, Instruction, Collaboration	Hosted and taught comprehensive math lesson template that included links to digital manipulatives, extension materials, and related resources
Google Classroom https://edu.google.com/products/classroom/?modal_active=none	Instruction, Collaboration	Housed templates and forms for content instruction for TC's to implement in classrooms
Flipgrid https://info.flipgrid.com/	Instruction, Collaboration	Created short, video-based daily learning reflections and implemented in K-5 classrooms
Padlet https://padlet.com/	Instruction, Collaboration	Used as an advance organizer, prior knowledge prompt, and summarizer in TC course sessions
Zoom https://zoom.us/	Communication, Instruction, E-coaching	Delivered remote teaching and coaching for TC's
Social Media https://www.facebook.com/ https://twitter.com/explore https://Instagram.com	Communication, Engagement, Resiliency	Disseminated evidence-based training opportunities and certifications; Celebrate 'intern of the week;' Re-post student and school partnership testimonials
Microsoft Teams https://www.microsoft.com	Collaboration	Permitted remote work and continued access to high-value documents (e.g., FERPA-certified document manager for PIR's, staff, and faculty collaboration)
Podcasts https://www.buzzsprout.com/	Engagement, Instruction	Streamed professional development and topical mini-sessions for culturally responsive pedagogy, meeting the needs of diverse learners, and developing highly-accessible lessons during remote learning

Utilizing social media platforms supported PST engagement and resiliency. Emerging literature suggests the innovative community building potential of social media within higher education (Chugh & Ruhi, 2018). The use of social media enhanced rapport building, enabled networking potential with partner schools, and created support systems. The simultaneous emphasis on professional learning and relationship building furthered the goal of sponsorship of PSTs (Ang & Ang, 2019; Walters et al., 2019).

RESULTS

The most striking results to emerge from the digital sponsorship of PSTs were (a) the 100% completion rate of PST internships and senior graduation, and (b) the teaching placement offers extended to graduating PSTs *outside* the teacher recruitment season and during a pandemic. Despite the upheaval caused by the COVID-19 crisis, all PSTs within the TQP project completed program requirements and competencies within their coursework and internships for the Spring 2020 semester. Responses from PSTs suggest that the use of technology to enhance and continue the PIR sponsorship relationship with PSTs was critical to this outcome. PSTs stated "We stayed connected … using Zoom," "We could … rely on weekly meetings to be updated about class and announcements…ask our questions and know we weren't alone;" and "I really felt like my teacher really cared about me, especially during this time." Above and beyond program completion, senior-level PSTs in the program received job offers at partner site schools in advance of typical outside hiring timeframes and despite the slow hiring process due to the pandemic. Within just one month of program completion, 40% of TQP project senior PSTs were hired for positions at partner school sites for the 2020-21 academic year.

IMPLICATIONS

The COVID-19 pandemic brought about a "new normal" to all aspects of society, especially education. As we reflect on the changes and resultant innovations, it is important to ensure that breakthroughs born from the crisis are not limited only to that time and space. Within the TQP project, the lean into technology and social media to ensure learning, engagement and connection for PSTs is a novel practice that should be continued. The simultaneous and creative use of low-tech and high-tech tools addressed challenges of continuing internship experiences for PSTs through remote learning, equitable access, and building collective resiliency.

As educational practices were revised in response to the COVID-19 crisis, the potential adoption of innovative, remote learning practices will affect educational "new realities".   For example, the use of technology during clinical experiences of teacher preparation at UCF has highlighted several innovative uses of technology for potential, systemic adoption. Technology could provide equitable access to information and support, an issue which does not solely exist within a pandemic (Anderson, 2019). The use of multiple digital methods during this crisis resulted in the continued mastery and demonstration of competencies during clinical experiences by TCs. A multi-platform approach was used by faculty and PIRs to provide solutions relevant during and after the crisis (Pierszalowski et al., 2018; Smale & Regalado, 2018). Use of digital platforms for instruction and mentoring in teacher preparation programs served PSTs through increased access to content, resources, and sponsorship during the pandemic *and* into the future (Baker, 2020; Curran & Chatel, 2013). In addition to supporting PSTs during their clinical experiences, the PSTs simultaneously became technologically literate educators (Tempornsin et al., 2019; Zimmer, 2019) for 21st century education demands (Maher, 2020; Palilonis & Watt., 2019).

The TQP project continuously used multiple social media platforms to support, engage, and connect PSTs. Resources, professional learning opportunities, polls, and updates promoted morale and community. Topics included educational technology, accessibility, mental health and wellness, and information related to COVID-19 and remote teaching were posted across multiple social media platforms to reach all PSTs. As teacher preparation programs continue to respond to the pandemic and engage in improvement work beyond the crisis, maximizing and formalizing the use of social media platforms can enhance access, connection, and engagement among PSTs and faculty partners in the teacher preparation program and school sites (Krutka et al., 2017; Lau, 2018; Saini & Abraham, 2019). Leveraging social media to increase the access and connections that are crucial to a teacher preparation program can be transformative for all stakeholders (Fitzgerald et al., 2016; Hou & Macnamara, 2017; Lavergne, 2017).

Future Research

The innovative use of technology and social media within the TQP project during the pandemic suggests specific areas of research related to teacher preparation. Although plenty of research addresses the role of technology in teacher preparation (Cheek et al., 2019; Firestone & Rodel, 2020; Mitchell & Appleget, 2020), e-coaching remains an area ripe

with opportunity. Social media engagement research may provide enhanced professional development given its ability to build community and morale (Munoz et al., 2014). Increased emphasis on the role of the "digital mentor" (Curran & Chatel, 2013) warrants further exploration to increase coaching opportunities within internships and could be a transformative tool for building presence, engagement, connection, and collective resiliency within teacher preparation

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Preservice Teacher Perceptions of Transition to an Electronic Portfolio as a Substitution for Practicum Experience

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When the COVID-19 pandemic began its unprecedented spread in the United States in early 2020, university preservice teachers were in the process of completing a 95-hour practicum experience in local classrooms. In March, as school districts began closing in response to the pandemic, preservice teachers encountered incomplete practicum experiences; many of them had less than half of their hours completed. The college implemented an online portfolio as a substitute for completing in-person practicum hours. When completed, this portfolio will be shared with the student's cooperating teacher to have as an additional resource. The preservice teachers completed a survey to provide feedback on the experience for the university department and faculty.

INTRODUCTION

As COVID-19 began its spread through the United States, preservice teachers were unable to complete required practicum experiences in community schools. As a result, the college determined an electronic portfolio (e-portfolio) program would be an acceptable replacement of practicum hours. The use of e-portfolios has been accepted as a means not only for enhancing learning but also for understanding goals preservice teachers set for themselves, the ways they achieve their goals, and the relationship to their institution's goals. E-portfolios are often used in teacher education as a way to measure teacher growth and reflective practice.

According to Pegrum (2017), "Preparing students for their future social, working, and civic lives in such a diverse and often unpredictable world requires fostering twenty-first-century skills" (p. v). Portfolios can often be an effective assessment tool in determining student achievement of these twenty-first-century skills. Portfolio assessment refers to both a process as well as a product and "provides a cumulative record of a preservice teacher's development and achievements" (Ryan & Kuhs, 1993, p. 76). Preservice teachers include information that best represents what they know about teaching as well as evidence of what they have learned, and faculty assess those efforts against educational best practices. Research has shown that many students prefer using e-portfolios and believe that they will increase their motivation to complete coursework (Akçil & Arap, 2009; Birgin, 2008).

INNOVATION

Prior to the COVID-19 pandemic, elementary preservice teachers participating in practicum completed 95 hours of teaching and observing within an elementary classroom. This practicum is paired with the preservice teachers' senior-level coursework, which is completed immediately prior to student teaching. These courses include reading assessment, math methods, social studies methods, and science methods. Preservice teachers are evaluated using the Danielson rubric (https://bit.ly/2MmFDvu) and on their ability to create lesson plans, interdisciplinary unit plans incorporating more than one subject, and teach two lessons (Danielson, 2007). School closures due to the pandemic made the completion of the process within a traditional classroom impossible.

The professors of the four accompanying university courses and the practicum professor decided to have preservice teachers create materials and construct an e-portfolio to encourage active learning. According to Bolliger and Shepherd

(2010), "E-portfolios help to motivate students and help them gain technology, reflection, and content-specific skills" (p. 295). Preservice teachers created a website (https://bit.ly/2yU4B2e) and met their practicum requirements by demonstrating their lesson planning and teaching skills in the e-portfolio sites. The University used Google Sites to construct e-portfolios. This platform was selected due to its ease of use, accessibility, and the preservice teachers' familiarity with Google Sites. Preservice teachers developed lesson plans, video lessons, and an interdisciplinary unit plan to showcase strategies that their cooperating teacher could use to assist with the non-traditional instruction of their elementary classroom students. All of the activities and lessons they created were added under individual tabs for each course. The professors of the accompanying university courses evaluated the preservice teachers on their pedagogical practices and knowledge of the subject matter.

The practicum professor provided an example portfolio site (https://bit.ly/2yU4B2e) for reference, and a checklist of items to include for each corresponding university course. Each corresponding professor of record created and evaluated the individual assignments for evidence of learning. Upon completion of the portfolio, the practicum professor used the checklist rubric (https://bit.ly/36Wm1I3) to evaluate the portfolio for completeness. If successful, the number of hours spent creating this portfolio counted as credit for practicum.

RESULTS

Preservice teachers had approximately four weeks to construct their portfolios. The University transitioned to online-only instruction in mid-March 2020 and continued until the semester completion in April 2020. Afterward, they completed an anonymous survey (https://bit.ly/305zrAl) via Google Forms from faculty to measure the effectiveness of the portfolio process as a substitute for completing practicum hours. The survey asked (1) How would you rate the effectiveness of completing a practicum portfolio as a substitute for on-site field experience, given the circumstances of the recent COVID-19 school closures? (2) Do you feel that the practicum portfolio allowed you to share your knowledge of lesson planning and classroom instructional strategies?

As evidenced in the survey, 64% of preservice teachers perceived the e-portfolio to be an acceptable way of showing pedagogical abilities. The preservice teachers appreciated the opportunity to demonstrate their creativity and knowledge base in a new format. However, the preservice teachers were divided on whether the e-portfolio was a viable substitute for an on-site practicum. Fifty percent (19/38) of respondents rated the experience as an ineffective or somewhat effective substitution. The results indicate that substituting classroom experience for digital experiences was not an ideal embraced by all students. There is significant learning that takes place within a classroom, and although the e-portfolio was used as a substitute due to an emergency situation, students prefer a face-to-face experience.

Do you feel that the practicum portfolio allowed you to share your knowledge of lesson planning, classroom instructional strategies, and pedagogy?
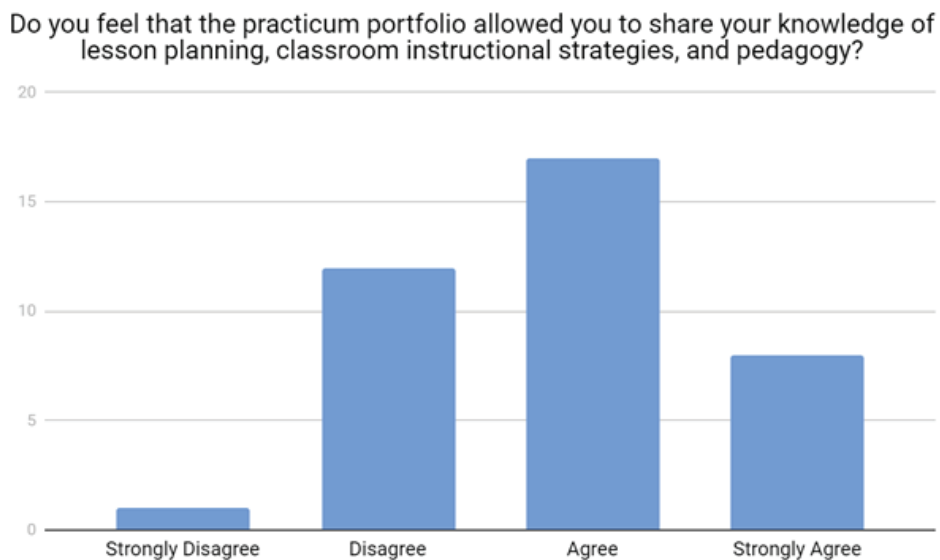
Figure 1

How would you rate the effectiveness of completing a practicum portfolio as a substitute for on-site field experience, given the circumstances of the recent COVID-19 school closures?
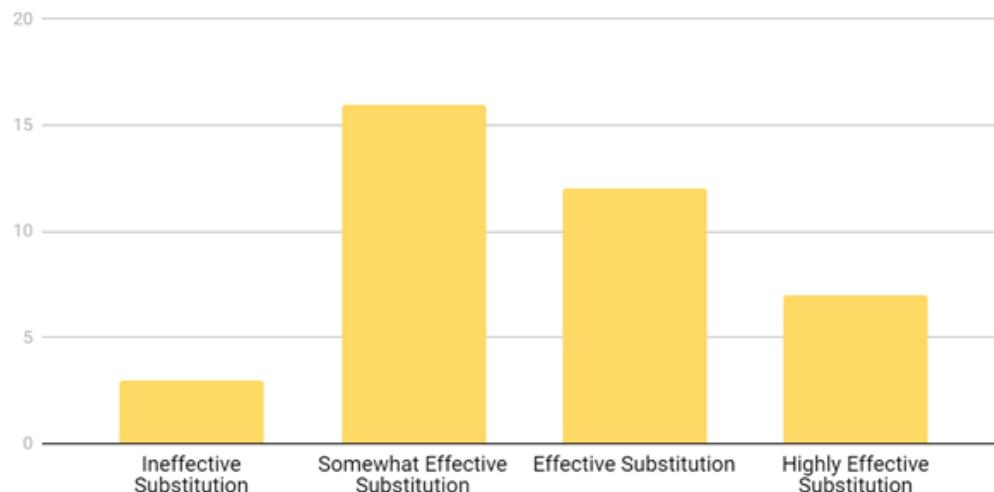
Figure 2

IMPLICATIONS

In order to replicate this practice, a teacher education preparation program should consider the following:

Collaboration

Collaboration is key to successful teaching. The idea of collaborative practice is based on the thought that successful teaching depends on the expertise of everyone involved in the learning environment (Bavonese, Connor, Wheat, Beard, and Owens, 2017). When we learned that face-to-face classes and practicum experiences were being canceled, the elementary program coordinator scheduled a meeting with all professors and field supervisors. The goal of the initial meeting was to collaborate and discuss which requirements and assignments would be affected due to the campus closure and how we could rework those tasks using technology while maintaining rigor and purpose. In subsequent meetings using the Zoom platform, professors and supervisors worked together to determine what should be completed by practicum students in order for them to demonstrate mastery as well as meet the state requirements for practicum.

Creating the Content

According to Janosik and Frank (2013), teacher education programs that regularly utilize e-portfolio prepare students from the beginning of their program for the objectives and learning outcomes. There is ample class time spent discussing and developing materials for the e-portfolio and preservice teachers are often being encouraged throughout the process to think about what to collect and select as well as how to make connections with artifacts that will show what they have learned and the skills they have acquired. We recognized that as a program that does not build e-portfolios from the beginning of practicum experiences, our students may struggle with what to include in their e-portfolio. This led the professors and practicum supervisors to compile assignments for the preservice teachers that would enable them to showcase their knowledge of pedagogy and the skills they acquired. Selecting the assignments and activities for the preservice teachers also relieved any additional stress they would inevitably encounter in a process they were unfamiliar with.

Teamwork

Working as a team was vital for the success of the e-portfolio due to the short timeline that professors had to adapt assignments and rubrics. Each accompanying professor decided what assignment(s) they would require to be showcased in the e-portfolio. They also created a rubric for the assignment(s) and graded the assignments as they were completed and submitted. This was imperative in order to avoid professors or supervisors being burdened with grading entire portfolios in subject areas they were not qualified in. This method worked well because we used Google Sites which allowed all professors and supervisors access to the students' work.

Dealing with Change

Janosick and Frank (2013) found that though the e-portfolio can be a very powerful experience, preservice teachers have difficulty adapting to change and they need regular reassurance. Even when using a platform many of our preservice teachers were familiar with, like Google Sites, the professors found it necessary to provide support through phone calls and Zoom sessions to help with website functions and answer questions about the assignments. Providing a sample site of a completed e-portfolio helped greatly, however continued assistance was needed.

FUTURE RESEARCH

The use of e-portfolios is not a new concept for teacher preparation programs. E-portfolios serve to address the necessity of preservice teachers to develop digital identities and to communicate their pedagogy and technology practices (Benander & Refaei, 2016). According to Wakimoto, Lewis, Rush, and Nogueiro (2019), "they are useful for students and instructors in terms of professional growth, critical thinking, reflection, assessment, and evaluation" (p 65). Thibodeaux, Cummings, and Harapnuik (2017) explain, "Although there have been many studies about e-portfolio learning and its use in higher education, much of the literature has examined assessment practices and knowledge sharing" (p. 1). There is less research about student perceptions of choice and voice regarding the process and use of e-portfolios, or their use during a pandemic.

As the university transitions into upcoming semesters, the emergence of e-portfolios as a viable substitute for in-person practicum field experience should continue to be revisited. We recognize that opportunities for open-ended student reflection are needed. Incorporating open-ended reflection questions will help explain the results of figure 2 and may garner thoughtful responses from preservice teachers that could guide research. This could be achieved by adding short answer questions to the Google survey.

We could also require preservice teachers to reflect on each of the specific assignments and activities included in their e-portfolio. Prompts could be provided by course instructors as needed. Established student-created structures like e-portfolios invite, foster, and support reflection (Landis, Scott, & Kahn, 2015). Inviting preservice teachers to reflect upon the effectiveness of their assignments through the lens of elementary students and parents working at home could produce more intentional lessons, activities, innovation, and differentiation.

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Adapting a Graduate-level Practicum Experience During an Emergency Response

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Situated learning theory posits that knowledge is a result of the activity, context, and culture in which it is learned. The circumstances surrounding the global pandemic gave practicum candidates one of the most real-world experiences possible. They were challenged with authentic, complex problems to which to apply the skills and knowledge acquired in the M.Ed. program. The practicum experiences were challenged when the pandemic resulted in public schools being physically closed with instruction moved to online and distance education solutions described by some as emergency remote teaching. Candidates had to implement technology leadership skills to circumvent obstacles to provide continuity of instruction.

INTRODUCTION

Students in GSU's Instructional Technology (ITEC) MEd practicum course typically work in K-12 schools applying the skills and knowledge gained throughout their program of study. The practicum experiences are mainly face-to-face in schools, while communication with their university supervisor takes place online. Due to COVID19 restrictions, within weeks all schools and universities were faced with providing online and distance education solutions described by some as emergency remote teaching (i.e. Hodges, Moore, Lockee, Trust, Bond, 2020; Milman, 2020). The timing of the physical school closures occurred at mid-semester. The sudden state-wide closing of all K-12 schools created a need for the rest of the practicum requirements to be accomplished online. The changes and adaptations reflected an opportunity to view the practicum through the lens of situated cognition as the authentic real-world context that facilitated the changes in a field-based experience.

INNOVATION

Participants were in-service teachers who were completing the state-required 100 hour ITEC field-based practicum. The practicum includes a variety of activities designed to immerse the candidate in real-world situations. One requirement is to deliver face-to-face technology-related professional development (PD) in a school using the Morrison, Ross, and Kemp model of Instructional Design (2010). In previous semesters candidates were expected to also create an online version of the PD and administer it to another group of school faculty.

Faced with the closing of all of the field-experience locations, many candidates were challenged to complete the required number of hours in the field as well as the face-to-face PD activity. In response, the university supervisors strategized several adaptations to meet these needs. Candidates limited the PD task to online delivery. Field-placement credit was given for some of the assignments candidates had previously completed in coordination with other educators. These included a time-intensive collaborative unit that candidates design and develop with school faculty and a series of interviews that candidates conduct with technology leaders at three different locations. Candidates were able to complete some of the site-based activities through atypical means such as using online tools to remotely conduct a school library program evaluation. Additionally, since the candidates are knowledgeable about online teaching pedagogy they were encouraged to log hours spent assisting fellow teachers with the switch to remote teaching. These changes gave candidates authentic experiences and filled an urgent need for the schools. Because of the context and culture in which these activities occurred, the candidates were functioning in an ideal situation for experiencing new knowledge and sharing their

skills (Brown et al, 1989). In addition to serving as consultants when needed, the candidates modeled key components of emergency remote learning as they were delivering their online PD. The candidates modeled incorporating instructional design as well as demonstrating how various platforms could be used to deliver instruction. Participants in the PD became full members of a community of practice which Lave and Werner (1991) describe as an opportunity for participants to acquire certain beliefs and behaviors.

RESULTS

The practicum final grade is based on S/U criteria. All of the students participating in practicum during Spring 2020 successfully completed all of the adapted course requirements. These adaptations were reflected in the capstone portfolios which each candidate completes as evidence of meeting program standards. Our students were able to adjust their practicum experiences and complete them successfully, though flexibility and creativity were required from all parties involved: supervising faculty, degree candidates, and participating schools.

Practicum is defined by Merriam-Webster (2020) as "a course of study designed especially for the preparation of teachers and clinicians that involves the supervised practical application of previously studied theory." The circumstances surrounding COVID19 thrust GSU ITEC Practicum candidates into one of the most real-world experiences possible. They were challenged with authentic, complex problems to which to apply their skills and knowledge acquired in the M.Ed. program. The opportunity to help their fellow colleagues adjust to the situation by sharing their knowledge about how to teach online resulted in this practicum becoming an experience of legitimate peripheral participation within a community of practice. The candidates and the mentor teachers acted as co-learning partners (Cobb & Harlow, 2017). Enabling our candidates to be contributors of educational change strengthened their identities as technology leaders (Patrick, 2013).

IMPLICATIONS

The goal of our Instructional Technology program is to equip educators with the knowledge, skills, and dispositions to be successful instructional technologists and school library media specialists with the ability to lead innovative technology integration and implementation in their organizations. The abrupt change in the practicum experience led to a successful conclusion for all the practicum candidates. It demonstrated to the ITEC faculty that our program does prepare our candidates to innovate. However, it also caused the faculty to recognize that they need to be proactive rather than reactive in planning for the unexpected.

The ITEC faculty are currently using this experience to guide redesign of the practicum experience. Going forward some proposed changes include the following:

1. Focusing on opportunities for practicum students to complete the majority of 100-hour field requirements online.
2. Eliminating the face-to-face professional development requirement and focusing on the online professional development activity.
3. Increasing the focus on establishing and fostering a "community of practice" to further enhance the context for situated learning (Brown et al, 1989, Lave & Wegner, 1991).
4. Designing activities throughout the program that will give candidates more authentic experiences; for example, candidates could serve as consultants to the teachers in their schools via a personalized social media platform.
5. Developing a Virtual Field Practicum using simulated experiences (Phillips, Wood, Yoo, Ward, Hsiao, Singh, & Morris, 2018)

One positive finding from this experience was that our students were able to use their ITEC skills and knowledge to great effect during the emergency school closing. While faculty and students in some fields at GSU were experiencing significant issues with students in clinical experiences or field placements that required human contact (i.e. health professions), our practicum students were comfortable with technology and the experience of being students in our fully online graduate program. This may be the result of our focus on authentic, project-based assignments throughout the program

of study and in the practicum course, thus giving the students relevant, real-world experience. This reinforces the notion that our program provides highly relevant skills and knowledge through the use of these real-world assignments. We will continue to ground our program in these types of experiences, and other Instructional Technology programs are encouraged to do so as well.

FUTURE RESEARCH

Baytiyeh (2018) points out that sustainability of education delivery in the face of disasters must be considered and planned for by all stakeholders. The emergency closures of schools and universities in response to the pandemic shed light on the lack of preparedness for educators to deliver instruction outside of brick and mortar settings. The emergency actions that were required for the practicum resulted in changes to the expectations of some of the experiences. As reflected in the candidates' capstone portfolios the changes implemented by the Instructional Technology program still gave candidates the experiences needed to develop and demonstrate knowledge and skills. As university supervisors prepare for an uncertain future with a state-required field-based experience, experience gained by the GSU faculty negotiating adjustments to the practicum course created a need to develop a plan to be implemented if a need for emergency remote teaching occurs in the future. Moving forward we intend to continue our research into portfolio creation (Downs, Jones, & Jenkins, 2015) to make sure that our candidates' culminating portfolios highlight the relevance and immediate usefulness of the skills and knowledge developed in our program.

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Teacher Educator and Preservice Teacher Construct Virtual Internship through Online Writing Class for Post-Secondary English Learners

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In response to COVID-19, many teacher education programs transitioned to remote instruction. This included a Master of Arts in Education program for teaching English as a Second Language (ESL) to post-secondary learners, housed at a research university in the southeastern United States. The purpose of this chapter is to report preliminary actions and processes in transitioning a preservice ESL internship from a F2F context to a virtual context. In-progress findings suggest the importance of scaffolding and collaboration between intern and teacher educator for constructing this experience, of examining unique engagement and pedagogical practices necessary for online language learning, and of scheduling future virtual internships to equip preservice teachers for online instruction. Preliminary results already inform program development of virtual internships for subsequent semesters, producing curricular changes for preservice teachers needing experience with teaching online, and increasing case study and program evaluation research within this institution's ESL teacher education program.

INTRODUCTION

When university courses abruptly transitioned to remote instruction, a master's program in teaching English as a Second Language (ESL) needed to reconsider the instructional setting and internship format for teaching post-secondary English learners. Guided by Cognitive Apprenticeship (Collins et al., 1987) and Community of Inquiry (COI) (Garrison et al., 2001), a teacher educator consulted existing scholarship on virtual preservice internships and worked with a preservice teacher to co-construct a virtual internship for this intern to teach an online writing class to adult language

learners. Ample scholarship on virtual preservice internships exists (Ferdig, et al., 2009; Kennedy et al., 2013; Ruggiero & Boehm, 2016; Theelen et al., 2020; Waters & Russell, 2016). However, little is known regarding virtual internships in online ESL contexts. To address this gap, our chapter describes the process undertaken by a teacher educator and a preservice teacher for re-envisioning teaching and learning within a virtual internship.

INNOVATION

At a research university in the southeastern United States, ESL preservice teachers participate in clinical experiences each semester by teaching community adult ESL classes in face-to-face (F2F) settings. These experiences culminate in the program's fifth and final semester as a high-stakes internship. When this internship falls in the summer, preservice interns teach an ESL academic writing class for post-secondary language learners, coordinated through the local literacy council and community college (Spezzini et al., 2016).

To prepare for her summer internship, Ling Chan[1] started the spring semester by shadowing an ESL writing course at the university's English Language Institute (ELI). When all university courses went virtual, Ling's teacher educator, Josephine, realized that Ling's summer internship would also be going virtual. Although Ling was prepared for a F2F internship, Josephine knew that Ling would need intense scaffolding (Vygotsky, 1978) to prepare for a virtual internship because the program's methods courses and clinical experiences had not prepared preservice teachers for virtual teaching.

As a first step in scaffolding, Josephine arranged for Ling to continue her semester-long shadowing at the ELI, which had also transitioned all of its courses to online environments. Ling continued keeping detailed observational notes and composing reflections but shifted her focus to online teaching and learning. Faucett and Nugent (2015) assert that such observations and accompanying reflections are vital in preparing preservice interns for online teaching. Ling's observations of the ELI's online classes gave her many ideas for designing her own online class, such as using virtual breakout rooms for one-to-one writing conferences.

To further enhance this scaffolding, Josephine drew from the Cognitive Apprenticeship framework (Collins et al., 1987), which contrasts traditional apprenticeships – preparing preservice teachers to use specific skills in specific contexts – with cognitive apprenticeships, or empowering preservice teachers to adapt to myriad teaching formats and contexts, such as online learning. Josephine and Ling addressed the learning context by co-creating a needs assessment (Flowerdew, 2018) (Appendix), which Ling then emailed to her 16 future students. All of her future students confirmed having adequate devices, reliable Internet, no previous online learning experience, and a general interest to improve their academic writing skills. With this information, Ling analyzed these students' writing skills (Flowerdew, 2018). By establishing relationships with these students, she was able to gain insight to their motives. She was then able to create appropriate learning outcomes and also align the social presence, cognitive presence, and teaching presence of Garrison et al.'s (2001) Community of Inquiry (COI). While building her learner community, Ling also built an online platform following guidelines from the Universal Design for Learning (Rogers-Shaw et al., 2018). However, when Josephine realized that Ling's notion of online instruction still entailed substituting F2F class time with Zoom class time, Josephine shifted scaffolding activities and placed an even greater emphasis on effective online design and instructional practices.

To broaden Ling's perspective of online instruction, Josephine examined ways to clarify for Ling the concept of teaching presence, which Anderson et al. (2001) describe as the online instructor's many roles in coordinating content, course design, and student interaction. Each week during the month preceding Ling's virtual internship, Josephine and Ling shared their respective screens on Zoom and jointly explored Google Classroom, with Ling as teacher and Josephine as student. Also, while viewing videos that exemplified Anderson et al.'s (2001) concept of online teaching presence, Josephine would pause the video to initiate discussion. Supported by these scaffolded activities, Ling was able to internalize the essence of her own online teaching presence and, guided by Josephine's coaching, began brainstorming ways to integrate social and cognitive presence within her future online classroom. These scaffolded activities helped Ling progress from what she knew – teach ESL writing in a F2F environment – to what she would be doing – teach ESL writing in an online environment.

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[1]   Ling Chan is the pseudonym for an international student from China.

RESULTS

As Ling prepared for the transition from a F2F internship to a virtual internship, Josephine and the co-authors discovered unique challenges and growth opportunities when designing preservice virtual internships in ESL contexts and when preparing preservice ESL teachers for teaching online. First, because of a dearth in scholarship regarding virtual internships in online ESL spaces, the chapter authors triangulated literature from online learning, teacher education, ESL, and constructivist learning theories to arrive at an initial solution while program evaluation and case study research continues. Second, the sudden change from a F2F internship to a virtual internship highlighted the program's lack of teaching preparation in online contexts for preservice ESL teachers. Most importantly, pivoting the program's traditional apprenticeship to a cognitive apprenticeship (Collins et al., 1987) demonstrates the value of diversely situated internship sites – including virtual learning – for preparing preservice teachers to teach across a broad range of learning contexts.

IMPLICATIONS

Teacher education programs, especially preservice ESL programs, can adapt our chapter's initial process to their own programs. Our suggestions are as follows:

1. Preservice ESL teacher education programs should evaluate their methods curriculum to ensure that online English learning is included. Kessler (2018) asserts that the use of online modalities for English learner education will become not only "standard procedure" but perhaps indistinguishable from traditional F2F learning (p. 107). Preparing preservice ESL teachers for this reality is essential.

2. If preservice ESL teacher education programs incorporate online learning and teaching methods into their curriculum, a virtual internship constructed via a Cognitive Apprenticeship framework (Collins et al., 1987) logically follows to provide a situated, practical opportunity for preservice ESL teachers to practice what they have learned. Teacher educators should employ a needs assessment (Flowerdew, 2018) of preservice teachers to ascertain which scaffolding activities (Vygotsky, 1978) will be beneficial in preparing preservice teachers for the virtual internship.

3. Collaboration between teacher educators and preservice teachers is paramount and should draw upon scaffolding (Vygotsky, 1978) and constructivist learning foundations such as COI (Garrison et al., 2001). Such frameworks can inform the preservice teachers' online instructional site and the structure of the virtual internship.

4. Preservice teacher programs should evaluate their virtual internships in order to tailor them specifically to their own programs. Patton (2015) states that program evaluation is "the systematic collection of information about the activities, characteristics, and results of programs to make judgements about the program effectiveness, inform decisions about future programming, and/or increase understanding" (p. 178). Regular, systematic program evaluation in light of rapidly changing instructional modalities will ensure that preservice teachers are equipped for any instructional context.

5. Additionally, case study research should be conducted to discover the activities, perceptions, and experiences of preservice teachers as they move through their virtual internship. Case study research is helpful in answering questions of *how* and *why* (Yin, 2018). Preservice teachers can serve as bounded entities for research, with their activities, reflections, and perceptions providing valuable insight for future internship design.

FUTURE RESEARCH

Preliminary results have already proven valuable to our ESL teacher education program. We trust they will also inform others to construct and implement virtual internships for teaching post-secondary English learners. Currently, we are using Ling's summer internship experience to inform two virtual internships for this fall. Significant elements for extending our study into fall include the collaborative relationship between Ling and Josephine while planning the internship, Ling's teaching presence during internship, and Ling's perception of her overall internship experience. After conducting case study and program evaluation research on our summer and fall internships, we will synthesize data from these three preservice interns to design a virtual internship protocol. Our evaluation of program outcomes and curriculum should also serve to highlight programmatic gaps. Synthesizing our research and implementing new insights will im-

prove our program as well as provide updated findings for this emerging field of virtual preservice internships for teaching post-secondary English learners.

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Acknowledgement

APPENDIX

English Learner Needs Assessment
Summer Online Academic Writing Course

Welcome to Academic Writing! Please answer the following questions to the best of your ability. Questions 1 - 3 help me stay in touch with you. Questions 4 – 6 are about your learning experiences, especially in English. Questions 7 – 9 are about the technology you need for this online course. Question 10 is an essay question. Please write 1 or 2 paragraphs in English. Your answers will help me get to know your writing style and your goals for this class. Thank you!

1. What is your name?
2. What is your email address?
3. What is your phone number?
4. How long have you lived in the United States?
5. Have you studied academic writing in English before?
6. In which language(s) do you already have skills in academic writing?
7. What previous experiences do you have with online learning?
8. Which digital devices do you plan to use for this online course?
9. Do you have reliable access to the Internet?
10. In 250-300 words, please explain why you want to take an academic writing class, and what you are most interested in learning.

Using Google Docs and Hangouts to Support Student Teachers During School Closings

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When schools are closed for an extended amount of time, such as weather or global pandemic, student teachers and universities have to be creative in meeting the state's Department of Education's requirements with current technology tools available. Currently, there are limited resources and support for preservice and student teachers online and through districts; most of the support available are for licensed teachers. One approach to continuing professional development of preservice teachers is using Google Docs to continue writing lesson plans and collaborating with their cooperating teacher(s) and grade level partners along with Google Hangouts to meet with their university mentor.

INTRODUCTION

There are many resources and support online for teachers during the school closures; there are, however, less resources and support available for preservice teachers. The approach outlined is attempting to fill this gap by providing support for preservice teachers during their student teaching to continue to be involved, as much as possible, with planning and instruction delivery through the use of Google Docs and Hangouts. This approach focused mainly on student teacher collaboration with cooperating teacher and university mentor; student teachers also used this approach to continue distance teaching where allowed and appropriate. There are many cited benefits to using Google Docs in education, including the ability to work together in a coordinated way, hold chats, and complete programs from distant sites (Musungwini et al., 2016). Additionally, Google Hangouts were used to create video discussions for teachers and student teachers to meet, discuss lesson ideas, and support one another; this platform also allowed for student teachers to hold virtual office hours, review concepts, and record instructions for later playback (Carey, 2014).

INNOVATION

The use of Google based platforms is not a new phenomenon or an especially creative example of allowing student teachers to continue their programs and teach online; however, this is a free tool that only requires a Google account (Duffy, 2013). This option could be used when other technologies and approaches are not available (either from the school district or the candidate's program). Our university's Office of Accreditation and Certification determined that student teachers should continue to teach remotely to the greatest extent possible and plan lessons with their cooperating teacher. Since our university and many of the school districts were Google Schools the platform that our student teachers used was Google Docs and Hangouts; however, there are other free platforms that are very similar and can offer similar applications.

For many of our student teachers, remote teaching included planning and recording morning messages to be sent out, meeting remotely over Hangouts to discuss the week's distance learning plans with their cooperating teacher, and assisting in grading assignments. The student teachers described were a mix of general education elementary and double certification of general education elementary and special education. Many were at the half-way point in their student teaching before schools closed in their district. Even if student teachers are unable to continue to teach remotely, this option can still be used to provide support to them from their university mentor and cooperating teacher.

Planning

Student teachers still planned for lessons daily, as they would if they were in a physical classroom (Anderson et al., 2001; Esterhuizen, 2015). While the planning for distance learning was different than in the classroom, student teachers still created plans and activities for their students to do in their home to supplement and extend their learning. The student teachers were able to demonstrate that they were able to plan grade level and developmentally appropriate activities and lessons that were standards driven. All of the student teachers were able to remain actively engaged with their cooperating teacher and classroom virtually (Gugino, 2018); this included being involved in delivery of instruction for their classroom. Student teachers were expected to continue creating daily and weekly lesson plans that they then would teach virtually. Figure 1 shows an example of how Google Docs were used; specifically, in these examples the university mentor provided comments on a lesson plan that was being adapted to teach through distance learning. However, this example does not show the collaborative nature in which the Google Doc was used—to provide back and forth comments and feedback. Cooperating teachers and student teachers reported that they would use it to communicate back and forth daily on lessons, assessments, and general support of each other as a way to have all communication within a central location.

Figure 1. Examples of Using Google Doc to Provide Feedback for Planning.

Teaching

At our university, approximately 65% of the current student teachers reported that they were continuing to grade and provide feedback on assignments as they would if in the physical classroom. Many of the student teachers' early report indicated that they delivered the morning message (both synchronously and asynchronously-this was different for each student depending on their school's expectation) to their students, recorded and uploaded videos for their students to watch using Google Hangouts, and announced assignments that students should complete as part of the distance learning (Kobayashi, 2015). One of the unexpected outcomes of this was that the university mentors and the cooperating teachers were able to really see a creative side of our student teachers as they used Google Hangouts to engage the students.

Teaching through the Google tools increases both the educator's (i.e. preservice teachers) and student's competency in using twenty-first century technology and provides an opportunity to engage anywhere and anytime (Crane, 2016). Using this approach also extends on the findings of Lin and Jou (2013) that Google platforms can be used to effectively assist teachers and students in learning activities. Student teachers are still able to engage and teach students in an online format in both synchronous and asynchronous ways.

RESULTS

While this approach to student teaching is only reporting early results, anecdotally student teachers reported that they enjoyed being able to still connect with their university mentor and receive feedback on their lesson plans as well as discuss how the lesson might have gone. For those who were able to use Google Docs to create lessons with their grade level teachers and cooperating teacher, they reported to their university mentor that it was appreciated to be a part of the teaching team. Google Hangouts allowed for student teachers to collaborate and discuss their planned lessons with their cooperating teachers and university mentors (Kobayashi, 2015). Collaboration and working with a team are an important aspect of student teaching that is often rated as professional development; Google Docs allow for this type of collaboration while social distancing (Zhou, Simpson, & Domizi, 2012). Ishtaiwa-Dweikat and Aburezeq (2016) found that student teachers found the Google tools to be a valuable tool to improve teaching. Using Google Docs and Hangouts allowed for student teachers to ask their cooperating teacher and mentor questions about their planned lessons, about how the lesson would have been implemented, and discuss how the student teacher might have responded in the lesson to different learner situations. while not being in the physical space of a classroom and school, especially since the Department of Education stated that "technology is at the core of virtually every aspect of our daily lives and work" (2010, p. ix).

IMPLICATIONS

During short- and long-term school closings, student teachers should be given an opportunity to continue in their training as teachers (TNTP, 2020). While it may not always be possible for them to provide distance learning depending on their school and district, preservice teachers should be given support, especially in the areas of planning. Figure 2 outlines some steps for student teachers to work through once their host school has been closed for an extended amount of time (e.g., inclement weather, health or medical issues) in order to start using Google Docs and Hangouts during school closures.

Steps to Using Google as an Alternative
1. Calculate how many days of instructional time will be missed.
2. Communicate school closures to your university program.
3. Find out if host school already uses Google.
4. Communicate with cooperating teacher on the use of how Google Docs and Hangouts can be used to continue planning and delivering instruction. This should be as often to what planning would resemble if conducting instruction in the classroom.
5. Create a schedule for student teacher to meet with university mentor and cooperating teacher using Google Hangouts to receive feedback and support.

Figure 2. Steps to Using Google as an Alternative.

In addition, using Google Docs and Hangouts are not only suggestions during this current time of school closures due to Covid-19, but can also be applied to other times schools may be closed (Heggart & Yoo, 2018). Unfortunately, planning and collaborating does not measure the preservice teacher's ability to teach, but it is an alternative during this time of distance learning. In districts and schools where student teachers are unable to physically teach, one response to them fulfilling their requirements can be to still plan lessons and meet via Hangouts with university mentors to discuss their lesson and how it would have been implemented. For some schools and districts that are providing distance learning online, student teachers are encouraged to continue to meet with their cooperating teacher and plan and implement lessons, as best possible. One possible way student teachers can teach lessons would be to create and record a morning message using Google Hangouts.

Benefits of Google Applications

Some of the cited benefits of using Google Docs were that it is a free software that does not have to be purchased; many of the schools were already utilizing it so it did not require the K-12 students to learn a new software or technology. When sharing their lesson plans with their cooperating teacher and university mentor, student teachers shared those in Google Docs. Both the cooperating teacher and university mentor were able to make comments and observations throughout with all parties being able to see the feedback given. This was a great advantage as different mentors to the preservice teacher were able to collaborate on lesson plans. Feedback included but was not limited to academic writing resources; general concerns; ideas and tips for managing behavior, transitions, and instruction; and reflection of the lesson (Wills-Espinosa & Jalil, 2016). A secondary benefit of using Google Docs and Hangouts was to support the student teachers. At the time, there were limited resources to support student teachers in the field specifically. Our solution was to have them remain connected to their classroom, cooperating teacher, and university mentor to the fullest extent possible. Magiera (2020) recommends using Google Docs as a way to have a two-way conversation on documents. Using comments and the editing tools within Google Docs, cooperating teachers and university mentors were able to give meaningful feedback and provide support asynchronously.

Alternatives to Google

While there certainly are many benefits to using Google applications such as Docs and Hangouts to expand preservice teachers' planning and teaching in a distance format, there are other tools that are also free and very similar if the school or district is not a Google School where the same approach described can be achieved. Some similar platforms are Microsoft Schools, Teacher Dashboard 365, Virtually, Edmodo, and Kiddom. AlternativeTo (https://alternativeto.net/) also provides an alternative to Google Classroom (https://alternativeto.net/software/google-classroom/).

FUTURE RESEARCH

Future research needs to be conducted on the supports that preservice teachers need when faced with extended school closures. Additional research should also explore measuring the competencies and skills of preservice teachers for state licensure (i.e., can preservice teachers demonstrate teaching competencies through distance learning?). The impacts of using Google Hangouts and Docs to include student teachers as much as possible in the planning and delivery of online instruction will be followed up on over the next year to study the support of providing remote instruction while a student teacher and their perceptions on their ability to teach both in a physical classroom and online as first year teachers. It is hypothesized that this future study will highlight the need to support preservice teachers during school closures. While it is important to provide resources to lead teachers, preservice teachers soon will themselves be licensed teachers within their state and the field also should support them as emerging professionals.

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Utilizing Teaching Simulations for Small Group Mathematics Discussions in the Void of Field Placement Opportunities

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With the shift to online schooling, field placement teaching opportunities are not possible at this time. This void in experience requires innovative methods for allowing preservice teachers (PTs) to engage in the action of teaching. This chapter describes a simulation task in which PTs plan, implement, and analyze an inquiry-based, mathematical discussion. Virtual simulations are used as a context for PTs to enact their discussions, but other synchronous peer-to-peer contexts are possible using student work samples and student-learning profiles.

Keywords: preservice teacher education, teaching simulation, virtual simulation, mathematics, inquiry-based discussion, talk moves, Five Practices

INTRODUCTION

Field placements are often cited as the most influential experience for Preservice Teacher (PT) development (Tang, 2003). The enactment of teaching is where theory meets reality and many programs are emphasizing practice-based pedagogies to approximate elements of teaching early in teacher preparation programs (Grossman et al., 2009; Tyminski, 2014). The COVID-19 pandemic halted face-to-face school settings and subsequently PTs' opportunities to enact what they have learned within field placements. Teaching simulations are a pedagogy of practice (Lampert, 2010), and in this work refer to situations in which the PT acts as the teacher in facilitating instruction with others. Teaching simulations can be immediately integrated into online learning contexts in many ways, whether it be synchronous teaching situations with peers or virtual simulations with avatars (i.e., Dieker et al., 2016). These simulations serve as forms of enactments of teaching during this time. This article documents the use of virtual simulations to allow PTs to enact an inquiry-based lesson discussion with a small group of avatar students.

INNOVATION

Discussion facilitation is one of the primary pedagogical foci of the upper-elementary mathematics method course at East Carolina University (ECU). PTs are introduced to *Talk Moves* (Chapin & Anderson, 2013) at the beginning of the semester and these moves are a cornerstone of each assignment and lesson analysis. The talk moves (e.g., revoicing, prompting for further participation) are used as a tool to help PTs elicit and respond to student thinking. The other cornerstone is the *Five Practices* (Stein, Engle, Smith, & Hughes, 2008), which serves as a framework for shifting instruction to be more student-centered. These practices for orchestrating mathematical instruction include anticipation of student thinking, monitoring student strategies, selecting students to share their strategies, sequencing the order in which students will share, and connecting students' ideas to promote understanding. The *Five Practices* provide the framework for setting up a purposeful discussion and the talk moves help connect students ideas in that discussion.

In a typical implementation, PTs plan an inquiry-based mathematics lesson and teach the lesson in their field placement. One of the primary goals is to put the *Five Practices* into action and experience the difference from a tradition-

al teacher-directed lesson plan. Using readings (i.e., Lewis, Gibbons, Kazemi, & Lind, 2015), *Five Practices* and talk moves, PTs planned their lessons around a provided task, but school was moved to an online setting due to COVID-19 before they could enact their lessons in classrooms.

In response to the void of field placements one instructor created an assignment (see appendix) to simulate the process of selecting and sequencing student-work within a lesson and enacting a classroom discussion. Due to the focus of the original practicum lessons and the support provided by multiple readings (textbook and article), the content focus of the assignment was equipartitioning within a division problem that results in a fractional amount (e.g., sharing 5 brownies with 4 people). Using learning trajectories for partitioning with fractional amounts (Epson & Levi, 2011), the instructor created five student work samples and corresponding student-thinking profiles around these work samples (see Figure 1). These work samples and student-thinking profiles were meant to approximate what a teacher would see or hear as they monitored students working a task of this nature in the classroom.

Figure 1. Example of Student-thinking Profile.

Each PT (53 total) individually analyzed the student work samples and determined a specific mathematical learning goal to be the focus of their discussion. Of the five student-thinking profiles, PTs selected two to three students that would share during the discussion section of the lesson and sequenced the order they would have them share. The PTs developed a written plan for a student-centered discussion, utilizing talk moves and key questions to address the learning goal. This monitoring, selecting, and sequencing, typically would have occurred in-the-moment of a face-to-face practicum enactment. However, the ability to plan and write out details provided a unique opportunity for PTs to critically examine the factors that inform decisions about orchestrating a discussion within a lesson.

Next, PTs facilitated a 10-15 minute discussion within a virtual simulation. Mursion@ECU (http://ecu.edu/mursion) is an immersive simulator that allows individuals to interact with avatars controlled by a simulation operator. The simulation operator used the student-learning profiles to act as five upper-elementary aged students; that is, each student-avatar matched one of the student-thinking profiles. PTs utilized a videoconferencing platform (VC) to interact with the student-avatars. Each PT would join the VC session and by saying "begin simulation" the student-avatars would "enter"

the VC session (see figure 2). The PT began the discussion as if the student-avatars had just finished working on the mathematics problem and the PT had just finished monitoring, selecting, and sequencing. The PT then used talk moves to orchestrate the discussion to connect student ideas and promote understanding of the learning goal. Each session was recorded and uploaded in a media annotation tool (Colasante, 2011) that PTs used to complete the reflection assignment. PTs analyzed their recorded session to reflect on how they engaged students in the discussion with talk moves and the effectiveness of their sequencing in attending to the mathematical goal.

Figure 2. Virtual Simulation within Video-conferencing Platform.

RESULTS

Data from this innovation includes lesson plans, recorded enactments, reflections, and a post-survey. Upon preliminary review of reflections the collective perception of the experience was favorable even though many PTs shared nerves about the virtual simulation. Many PTs valued being able to plan and enact their discussion, acknowledging the benefits for development.

> As a pre-service teacher, the experience of being in the classroom is one every future educator looks forward to when pursuing their degree. When we did not get to be in the classroom, this experience has provided guidance to help build discussion, questioning, and confidence.

Another PT highlighted the feedback from the students in the enactment was powerful stating, "Having 'students' respond and react within our lessons allowed us to gauge the effectiveness of our pedagogy." From the final survey, majority of PTs recommended using the teaching simulation in future semesters.

In terms of *Five Practices*, preview of the recorded enactments and reflections revealed variation in learning goals and sequence of students, yet all PTs provided specific rationale for their sequencing and provided evidence to the effectiveness. In terms of talk moves, most enactments flowed with restatement and turn-and-talk moves while a few were more dyadic discussion. Further analysis will be completed to examine the sequencing of students and more specifically how the talk moves were used to connect student ideas.

IMPLICATIONS

Although forced to adapt, the teaching simulation allowed PTs to practice the *Five Practices* and facilitate a small group discussion using talk moves. The two critical components are the student-learning profiles and the opportunity to enact the planned discussion (Kazemi et al., 2016). The student-learning profiles, aligned with research-based learning trajectories (Wilson, Mojica, & Confrey, 2013), allow PTs to practice the select and sequence portion of instruction, while the virtual simulation or videoconferencing provide the space for PTs to facilitate the discussion of student thinking. In past semesters, PTs' first and only opportunity to teach in this way was with one lesson in a classroom. The

discussions were often rushed and disjointed due to in-the-moment decisions they had to make. The bulk of learning was centered around reflecting on the lesson and discussing modifications. In this teaching simulation PTs were able to hone in on the select and sequence portion of the lesson and plan and facilitate more detailed discussions. The teaching simulation provided a new opportunity for PTs, and the promising outcomes support integration into methods courses with or without field placements.

The virtual simulations utilized in this case added opportunity for discussion with student-avatars that approximated elementary students, but other options are possible to create space for implementation. These include small-group VC with peers where the peers "take on" one of the student-thinking profiles (more structured form of microteaching). The opportunity to enact the planned sequence allows PTs to experience the need for talk moves and connections between ideas (Kazemi et al., 2016) even though a face-to-face setting was not available.. Student work samples and student-learning profiles can be created for a variety of tasks to provide PTs with opportunities to facilitate discussions. We do feel that inquiry-based tasks are more amenable to the structure of this type of simulation because the open-ended nature of the tasks allows for multiple, anticipated approaches.

Based on lessons learned we offer the following steps to follow when developing a teaching simulation task:

1. **Create student-learning profiles.** Select a specific content focus for the task and front load readings and activities to support PTs' content knowledge as they work on pedagogical focus of facilitating classroom discussion. For this simulation, PTs read about partitioning strategies and an article that described a teacher's implementation of a similar task (Lewis, Gibbons, Kazemi, & Lind, 2015). Select inquiry-based tasks that will initiate small group discussion. For mathematics this might be a story problem, while for science it may be an investigation. From the tasks develop a set of student work/responses. Be detailed using research-based trajectories and approaches. Include descriptions of students' understandings, misconceptions, and questions that will create a picture of the learner (See Figure 1). These student-learning profiles will support the simulation.

2. **Consider technology resources.** Immersive simulation technology is available through *TeachLive* (http://teachlive.org/) and *Mursion (https://www.mursion.com/)*. It is also available through institutions of higher education that have site licenses. *Mursion@ECU* was utilized for the work described in this chapter. If using a virtual simulation, fewer sets of student-thinking profiles are needed because PTs are able to have individual sessions.

   It is worth noting that a recent search of synchronous, simulation programs unfortunately yielded zero free or open access tools that allow creation of content. This is definitely an area that deserves future consideration and funding. One asynchronous, multi-media platform is Lesson Sketch (http://www.lessonsketch.org/), which is free tool that allows you to create and annotate animations. These animations can include student work and questions from the student-learning profiles. Within this format, PTs will not be able to lead an interactive discussion, but they can annotate story boards that represent the classroom scene with instructional decisions and questioning prompts.

   If immersive simulation technology is not available, video conferencing can be used with groups of 4-5 PTs. In this format one PT will be the teacher while the others role-play as the students. This form of microteaching will be supported by the learning-profiles that will provide guidelines for student responses. If using video conferencing, approximately 4-5 tasks with corresponding sets of learning-profiles should be created to prevent PT fatigue with the same discussion. This will allow for each PT in the group to facilitate a discussion around a unique task.

3. **Develop task directions.** The goal is to provide a space for PTs to facilitate small group discussions. PTs will analyze student thinking-profiles to prepare for their discussion. Provide specific directions about the time limits, recording, goals, and reflection prompts.

4. **Schedule sessions and manage feedback.** To allow for flexibility of schedules you can allow PTs to sign up using an interactive form. Consider timing of feedback. Instructors can be present and provide

feedback during/after sessions, and in this case the simulation functions more like a rehearsal (Kazemi et al., 2016). Instructors can also choose to provide feedback using the recordings,allowing the simulation to function more like an enactment (Lampert, 2010). Instructors can also choose to provide feedback on PTs' analyses of their teaching through purposefully crafted prompts.

FUTURE RESEARCH

Teaching simulations take on increased value amidst the absence of field experiences. The use of simulations helps develop many high-leverage practices for PTs. Majority of research with simulations in mathematics education have focused on rehearsals with face-to-face, peer-to-peer settings (Kazemi et al., 2016; Ghousseini & Herbst, 2016). This current work extends teaching simulations into virtual immersive technologies and proposes synchronous VC sessions.

The next step is to examine and document key design elements of virtual teaching simulations that are essential in promoting PTs' development of teaching practice, specifically facilitating mathematical discussions. Themes from how PTs selected and sequenced students' work (*Five Practices*) will be analyzed, along with patterns in talk moves, to better understand the affordances and limitations of the teaching simulation. Future work will also focus on how to adapt instruction to include simulations of teaching into methods coursework now and when field placements return. Based on promising results from the current work, one long term goal is to study enacted practice in classrooms by PTs who have opportunities to engage with teaching simulations compared to PTs who do not have this rehearsal opportunity. The hope is that simulations can fill a void during our current reality and continue when classrooms are face-to-face.

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FINAL TEACHING SIMULATION DIRECTIONS

This teaching simulation is designed in 3 parts.

Part 1: Analyze student work, select a specific mathematical goal, select & sequence 2-3 student strategies that you will use as part of the discussion portion of your lesson. Write a plan for your discussion. Submit this for a participation grade before you teach.

Part 2: Facilitate your planned discussion in Mursion with a group of 5 students.

Part 3: Analyze your recording posted in GoReact under Final Teaching Simulation. Respond to the prompts for submission by May 4th at midnight.

Part 1: Planning Discussion
You are a teacher of a third/fourth blended classroom. You are starting your fraction unit with a series of story problems that are revealing student thinking.
You have launched the following task:

> *Coraline, Sarah, David, and Jayce bought some candy bars at the store. There were 7 snicker candy bars in total. These 4 friends wanted to see how they can equally share the 7 candy bars. How many candy bars will one friend get?*

As you monitor student work during the Explore portion of your lesson you observe the following 5 students. You ask them questions as they work to access and advance their thinking as they work.

Step 1: Analyze each student's work (in chart below). What does each student understand? What learning is still developing? How do the strategies connect? How can you facilitate learning?

Step 2: Select one or two specific mathematical goal/s for your discussion. You may select from the list below.
    Examples of specific mathematical goals:
- Students will begin to explain equivalence of fractions
  - Representations of whole and fractional parts
  - Different size pieces
- Students will identify and name fractional parts that result from fair sharing.
- Students will identify one as whole when interpreting fractional amounts.
- Students will use unit fractions (1/4) to represent one whole (4/4).

Step 3: Now select and sequence 2-3 students to share their work. Plan your discussion. Write this plan out. Make sure you are asking key questions and using talk moves. Make sure your mathematical goal is clear and you reiterate the goal so it is clear to students. Your goal is to facilitate learning-How are you going to know what students are taking away? Post your written plan before you teach. This is a participation grade.

Part 2: Facilitate your discussion in Mursion at your scheduled time

Part 3: Analyze your teaching

Analyze your recording of your teaching simulation that is posted in GoReact. Complete the analysis of your teaching by responding to the prompts posted here. Due May 4th at midnight.

Student work observed during explore section of lesson:
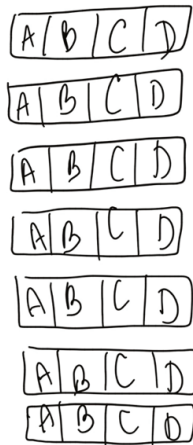
Will	**Carlos**
A B C D A B C D A B C D A B C D A B C D A B C D A B C D Each person gets 7 pieces.	$= \frac{7}{4}$ $= \frac{7}{4}$ $= \frac{7}{4}$ $= \frac{7}{4}$
Jayla	**Mina**
1 2 3 4 1 2 3 4 1 2 3 4 1 and $\frac{1}{2}$ and $\frac{1}{4}$	2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 Each person gets $1\frac{3}{4}$
Emily	Questions to think through: ● What does each student understand? ● What learning is still developing? ● What questions will probe student thinking to make it visible to other students? ● What questions will advance the student's thinking? ● What questions will connect one strategy to another? ● What can I emphasize to bring out the mathematical learning goal? ● How can I use the talk moves to get students to listen and talk to one another?
Each person gets $\frac{7}{28}$ $4 \times 7 = 28$	
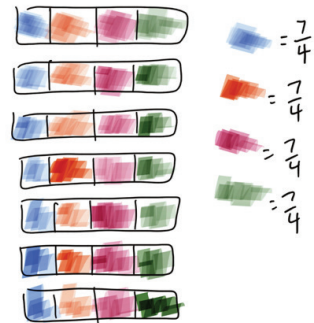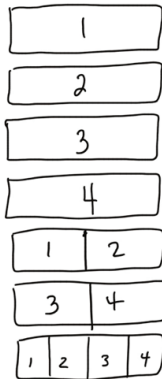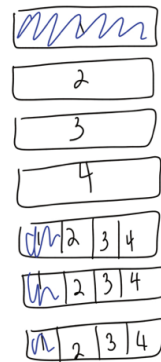
Virtual Field Experience and Mock Interview Opportunities for Preservice Special Education and Secondary Teachers

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In-person field experiences and mock interviews for preservice teachers became impossible when traditional face-to-face classes were cancelled and schools transitioned to remote learning methods. One instructor made creative use of Zoom, an online video conferencing platform, to help preservice teachers gain realistic school experience and interview skills as well as to allow for genuine interaction to continue. From the instructor perspective, student engagement and learning outcomes regarding these virtual activities were just as effective as traditional face-to-face classes. Preliminary survey results indicated students felt video conference-based experiences were a positive substitution for traditional in-person situations given the pandemic closures.

Keywords: preservice teachers, special education, secondary education, field experience, mock interview, general education, remote learning, virtual learning, video conferencing

INTRODUCTION

Teacher preparation programs at U.S. universities require their teacher candidates to obtain a given number of hours in public school field experiences prior to student teaching. Additionally, preservice teachers (PST) preparing to apply for employment often need practice with face-to-face educational interview skills. These in-person experiences became impossible when traditional face-to-face classes were cancelled and schools transitioned entirely to remote learning methods due to the COVID-19 pandemic. This chapter documents how one college instructor made creative use of Zoom, an online video conferencing platform, to help preservice teachers gain realistic school experience and interview skills. The use of video conferencing as a means of providing real-life experiences to PST has been credited by researchers and educators (Benitt, 2019; Knapp, 2018; Palumbo & Bennett, 2016), but the reported innovative way of using video conferencing during the pandemic time elevated it to a new level of engaged learning.

INNOVATION

Zoom Field Experience Process

Being in charge of two courses, the instructor reached out to professional contacts for assistance when public school closures meant PST would be unable to complete field experience hours. For the first field experience course, focusing on teaching strategies and behavior management for individuals with moderate, severe, or multiple disabilities, professional contacts were parents of individuals with disabilities. Each parent and her child with a disability agreed to virtually meet with the PST and the course instructor, share their home and school experiences with the disability, and discuss course topics. A second field experience course focused on instruction of students with disabilities in secondary education classrooms, both self-contained and inclusive. Contacts for this course were teachers, of both secondary special and general education, who agreed to discuss their experiences with and methods for including students with disabilities in their classrooms along with non-disabled peers.

In place of field experiences, students met as a class with parents and teachers of individuals with disabilities using Zoom video conferencing. See Tables 1 and 2 for specific topic information. Prior to each meeting, Students RSVP'd to

each Zoom field experience session using a virtual form created in Google Forms and included three questions to ask guests if they would unable to attend live; an example is provided at https://bit.ly/2XNIqDe. During the meeting, PST virtually interacted with the individual with a disability, the parent, and/or the teacher and asked questions. The course instructor highlighted important concepts related to course topics throughout the conversations. Recorded Zoom sessions were posted in Canvas, a learning management system, for students who were unable to be present. Finally, all students wrote reflections for each Zoom experience and reported their virtual contact hours in Canvas to be approved by the course instructor.

Table 1
Zoom Field Experience Sessions with Parents of Individuals with Disabilities

Zoom Session	Guests	Topic
Week 1 - Session 1	A mother, son (nonverbal with Down Syndrome, age 25), and daughter (sibling of an individual with a disability)	Teaching Self-Care Skills
Week 2 - Session 2	A mother, father, and daughter (born with Down Syndrome, age 6 months)	Family Advocacy
Week 2 - Session 3	A mother and daughter (nonverbal with Rett Syndrome, age 12)	Supporting Peer Interactions, Relationships, & Belonging
Week 3 - Session 4	A mother and son (functionally verbal with Autism and Echolalia, age 11)	Teaching Communication Skills
Week 4 - Session 5	A mother and daughter (nonverbal and tube fed with CDKL5 Deficiency Disorder, age 6)	Understanding and Meeting Health Care Needs

Table 2
Zoom Field Experience Sessions with Teachers of Individuals with Disabilities

Zoom Session	Guests	Topic
Week 1 - Session 1	Middle School Special Education Teacher in Alaska (teaches in both self-contained and inclusive settings)	Implementing Accommodations & Modifications
Week 2 - Session 2	Middle & High School Social Studies/Speech/Special Education Teacher in Nebraska (teaches in inclusive settings)	Implementing Accommodations & Modifications
Week 2 - Session 3	Private Middle School Teacher for Students with Behavioral and Learning Differences in Texas (teaches in one-to-one setting)	Implementing Accommodations & Modifications
Week 3 - Session 4	High School Science Teacher in Nebraska (teaches in inclusive settings)	Implementing Accommodations & Modifications
Week 3 - Session 5	A mother (retired teacher), son (25 years old and adopted with a Traumatic Brain Injury), and daughter (Special Education teacher and sibling of an individual with a disability)	Transition to Adult Living

Zoom Mock Interview Process

The instructor of future secondary educators requires these students to complete an in-person final in the form of an educational mock interview. She acts as a hiring principal and asks common interview questions PST will likely face when applying for future jobs in education. Because these interviews could no longer take place in person, she implemented virtual mock interviews using Zoom.

Using SignUpGenius (https://www.signupgenius.com/), she created a schedule that allowed students to sign up for a 25-minute mock interview time slot. An example is provided at https://bit.ly/2MegHGt. The week prior to mock interviews beginning, she scheduled each meeting using Zoom and emailed PST their respective meeting invitation. Posted in Canvas were the Mock Interview Questions (https://bit.ly/2XgzNCh) and Mock Interview Evaluation Rubric (https://bit.ly/3eC3hR0) to allow students to prepare.

When it came time for the interviews, PST clicked the link that had been emailed to them the week before and the instructor began each meeting using Zoom. She informed students she would be taking notes in order to provide immediate feedback and acted as a hiring principal. The instructor asked questions from the provided mock interview questions and assessed each student individually using the evaluation rubric. Question and answer time lasted approximately 20 minutes. The final five minutes of the scheduled time allowed the instructor to explain to students the interview was complete and to provide feedback. She then emailed PST their completed rubric and began the next interview.

RESULTS

From the instructor perspective, student engagement and learning outcomes regarding these virtual learning activities were just as effective as traditional face-to-face classes. In addition, the instructor conducted an online survey to examine her students' perception about virtual field experiences and mock interviews. Preliminary survey results indicated 100% of students (N= 49) felt video conference-based activities were a positive substitution for traditional face-to-face situations given the pandemic closures. Results are displayed in Table 3.

Table 3
Video Conferencing Feedback Survey Results

Survey Question	Agree	Disagree
I felt the use of Zoom Video Conferencing in place of field experience for TESE 371 was a positive substitution.	14 Responses 100%	0 Responses 0%
I felt the use of Zoom Video Conferencing in place of field experience for TESE 474 was a positive substitution.	9 Responses 100%	0 Responses 0%
I felt the use of Zoom Video Conferencing in place of my in-person mock interview for "TE 306: Reading & Inclusion in the K-12 Classroom" was a positive substitution considering the situation.	26 Responses 100%	0 Responses 0%

IMPLICATIONS

Zoom Field Experiences

In an immediate need for continued learning via remote methods, the use of Zoom video conferencing to offer authentic experiences for PST was an extremely promising change. Positive learning effects have been demonstrated with the use of virtual field trips as opposed to actual field site visits (Zhao et al., 2020). In the event that future in-person public school field opportunities may be cancelled, teacher educators can reach out to professional contacts and invite them, whether they be parents and/or teachers, to take part in video conferencing class discussions. Discussion topics may be chosen specifically for the guests' comfort and expertise areas in order to increase volunteer participation. Additionally, sessions can be scheduled around the guests' availability and recorded for students to view if they are unable to attend live. Video conferencing as a means of providing real-life experiences to PST has been credited by researchers and educators (Benitt, 2019; Knapp, 2018; Palumbo & Bennett, 2016). Virtual field experience opportunities can serve as a viable option for any situation in which teacher educators are unable to have PST take part in face-to-face public school field experiences.

Zoom Mock Interviews

In preparing the PST for professional interviews, the use of video conferencing can provide a real-life experience and significantly advance interviewing skills (Hudak et al., 2019). Teacher educators and researchers can utilize these methods to continue preparing future educators even when traditional face-to-face methods are no longer available. Additionally, educational administrators looking to hire PST for future professional positions may employ this mock interview method in real-life situations as circumstances warrant the need for virtual interviews. Mullin et al. (2016) found online interviewing to be just as effective as in-person methods. Additionally, results from a study by Chiumento et al. (2018) suggested that online interviewing is an ethical, practical, and versatile option. Online scheduling tools, such as SignUpGenius, may be utilized to plan interview times ideal for both the teacher educator or educational administrator and the PST. Mock interview participants in this situation reported overwhelmingly positive feelings regarding the use of Zoom video conferencing. Virtual interviews can be a sustainable option for teacher educators and educational administrators in any case that in-person interviews are deemed impossible.

When more and more higher education institutions are moving their campus completely online or taking a hyflex learning model, courses delivered both in person and online, at the same time and by the same faculty member, may become more prevalent. Students can then choose, for each and every class meeting, whether to show up for class in person or to join online. Using video conferencing for field experience opportunities and/or to provide real-life interview experience for PST is something school administrators and educators can take immediate advantage of.

FUTURE RESEARCH

The use of Zoom video conferencing in place of public school field experiences and in-person mock interviews was such a positive change that the instructor has begun planning for coming semesters in the event that virtual learning methods are still needed. Researchers have credited the use of online video conferencing as a viable alternative in place of in-person activities (Benitt, 2019; Knapp, 2018; Palumbo & Bennett, 2016). Additionally, online interviewing can be just as effective as in-person methods (Chiumento et al., 2018; Hudak et al., 2019; Mullin et al., 2016). For future studies to further understand this interesting phenomenon of remote learning, researchers may replicate this practice in general education to see whether the same results occur. Furthermore, large scale sample studies regarding students' perception on remote learning and virtual field experience can provide researchers, educators, and administrators with valuable instructional feedback.

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Creating Meaningful Learning Experiences for Pre-Service and In-Service Teachers Facing Interruptions in Field Experience Placements During the COVID-19 Pandemic

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In teacher education, the heart of learning culminates in field-based experiences. When these become interrupted such as during COVID-19, teacher educators can be challenged to create alternate learning opportunities. One professor used written and video-based case studies in lieu of cancelled field placements. Survey responses indicate students believed course adjustments were useful and provided meaningful learning experiences for them: 52% said they benefitted most from the case studies and showed preference for video formats over written cases. Case studies, then, can help effectively create meaningful learning opportunities analogous to field experiences, and promote engagement during remote learning.

INTRODUCTION

In Teacher Education, the heart of learning culminates in field-based experiences which connect theory to practice (Sturmer, Konings, & Seidel, 2015). Consistent with a constructivist framework, field experiences actively engage students in authentic situations (Dewey, 1938) that challenge and expand their existing knowledge (Piaget, 1952) until they can distill these reflections into abstract concepts applicable to future experiences (Kolbe, 1984). Field experiences are powerful because they create genuine connections between ideas and experiences (Darling-Hammond, 2000) which immerse students in complex learning environments where they analyze situations, solve problems, and hone teaching skills. When field experiences become interrupted, as happened during the COVID-19 pandemic, educators can be challenged to find alternatives. One strategy, case studies, builds upon experiential learning theory which harnesses observation and reflection to challenge misconceptions and crystalize learning concepts (Dennick, 2012). Case studies capture the problems and challenges of teaching in specific contexts and require the learner to analyze and reflect to provide a solution (Gunther, Fleige, Upmeier zu Belzen, & Kruger, 2019). Case studies usually supplement, rather than supplant, field experiences. However, when these become interrupted, case studies may create meaningful learning opportunities to mitigate experiences lost.

INNOVATION

COVID-19 created this situation for one professor teaching two sections of an Early Childhood Special Education course which required students--both in-service and pre-service teachers--to work with two children with special needs and attend Early Intervention home visits. This mentoring would have scaffolded learning so students could make critical connections they could not make on their own (Vygotsky, 1978). However, when school closures and early childhood program restrictions cancelled these opportunities, the professor was challenged to find meaningful alternatives. Also, online delivery requires students to demonstrate more responsibility and accountability for their learning (Hoskins,

2011), and even if they were familiar with technology for personal use, they could not apply these for educational purposes (Greene, Yu, & Copeland, 2014).

The lack of field experience created three gap areas: home visits, journal entries, and summary reports. To replace home visits, the instructor searched for home visits students could virtually observe. She used the Results Matter Video Library (https://www.cde.state.co.us/resultsmatter/rmvideoseries_justbeingkids) which has six videos in the "Just Being Kids" series of Early Intervention home visits. The videos are free and publicly accessible, and the YouTube format can be watched on multiple devices that students owned (see Figure 1).

Figure 1. A screenshot of the Results Matter Video Library.

Since some students had attended one or more visits before schools shut down, the instructor adjusted assignment instructions to allow students to combine actual home visit observations with video or use all video observations as needed. She also provided an observation form to scaffold students' analysis and a grading rubric to guide their writing of their paper. These supports made it easier for students to be more independent in their learning online (see Figure 2).

Figure 2. A screenshot of the home visitation report layout.

The second assignment gap area was weekly journal entries where students had to identify teaching objectives for assigned children, plan and implement instruction to meet those objectives, measure children's progress in their learning, and reflect on the teaching experience. To replace the journal entries, the professor wrote short scenarios of fictitious children and asked students to analyze, plan, and reflect as if they were teaching these children. She provided clear directions with questions to guide students in their analysis, and had students use a text entry format for their assignment (see Figure 3). This allowed direct, two-way feedback between the student and the professor, a critical feature for adult learning (Dennick, 2012).

Journal Eight--NEW

✅ Published   ✎ Edit   ⋮

Read the following scenario and in 2-3 paragraphs, tell me how you would teach this child:

Autumn is 2 years and 10 months old and has fine and gross motor delays. She is not yet walking. She can get herself into a sitting position if she is placed on her back. She can stand alone for at least 10 seconds. She can sit back down if she has been standing. Her physical therapist feels Autumn is ready to work on pulling herself to stand so this is her new IFSP goal.

This week's objective is to have Autumn pull to stand, with teacher assistance, and remain standing on her own for at least 10 seconds at least two times out of five attempts.

Your job is to plan two different activities that will provide multiple opportunities for Autumn to pull to stand. For each activity, tell how you will:

- Set up the activity and encourage multiple opportunities to pull to stand.
- Prompt Autumn to pull to stand, and what assistance might you provide to help her be successful.
- Assess and document her performance so you will know if she is making progress.

Assuming she can pull to stand successfully with full physical help from you:

- What would be your next steps when you teach her next time?
- How would you adjust the objective?
- How would you adjust your teaching?

Students will get points for the following:

- Description of each activity and how it is set up for multiple opportunities (4 points)
- How you will prompt Autumn in each activity and support her to do the task (4 points)
- How you will document Autumn's progress in each activity (2 points)
- What next steps you have for teaching each activity and how you would adjust the objective and teaching to continue progress (5 points)

Points   15
Submitting   a text entry box

Figure 3. An example of the journal entry scenarios.

The third gap area was the end of semester summary reports where students would have described their children, analyzed data from their teaching, and reflected on the experience. To replace the summary reports, the professor created two-page scenarios of fictitious children with special needs which included descriptions of the children's strengths and needs, documentation of how a fictitious teacher taught the children each session, and weekly data charts on how the children performed over time. She also created a form with questions to guide the data analysis so that students would be able to reflect on both the teacher's implementation and the child's responses over time. The form and grading rubric served to scaffold the students to independently analyze and write up their final papers (see Figure 4).

Figure 4. A screen shot of the summary report case studies.

In summary, the professor replaced field experiences with case studies that mirrored field experiences and provided scaffolding so students could take a higher level of responsibility for their learning in an online environment.

RESULTS

The professor sent an online survey via Qualtrics (see Appendix) to students as a link in a Canvas announcement just before finals to determine whether course adjustments actively engaged students in the learning process and provided meaningful experiences reflective of experiential learning. The response rate was 83% (35/42).

- 77% stated that the transition to remote learning was smooth, 17% were neutral, and 6% found it difficult.
- 100% believed they were well-informed on how to successfully complete the course, assignments and deadlines were reasonable to complete, and adjustments were sufficient to maximize remote learning.
- 94% said the course had a variety of learning materials to keep them engaged and, of the 25 students who wrote about what benefitted them most, 28% cited video case studies, 24% indicated written case studies, 16% said alternate assignment options, 16% mentioned miscellaneous factors (e.g. instructor flexibility, communication options), and 12% said all of the adjustments.

In summary, most students transitioned well to remote learning. Online learning requires students to integrate self-regulated learning with effective cognitive processing (Greene, Yu, & Copeland, 2014). All students indicated they were well informed on how to finish the course, thought course adjustments worked for them, and believed materials maximized their learning. One student took an incomplete due to COVID-19 factors, and the remaining students completed the assignments and passed the class with a C or better. Therefore, it appears they were able to apply sufficient self-regulation and cognition to accomplish this, and the assignment scaffolds supported this learning.

Also, 52% said they benefitted most from the case studies and found these meaningful. Experiential learning through case studies has been shown to foster critical thinking and self-regulation skills (Kreber, 2001) needed for online environments. Case study analysis supports the social construction of pedagogical knowledge and improves pre-service teachers' informed decision making on educational issues (Floyd & Bodur, 2006). Adult learners are better engaged when it is clear what they are learning will transfer to real life (Hoskins, 2011) and the case studies did appear to meet both pre-service and in-service teacher needs in providing meaningful learning experiences.

IMPLICATIONS

Teacher preparation programs rely on field experiences to help students connect theory to practice; however, challenging situations like COVID-19 may make access impossible. Case studies can effectively create meaningful learning opportunities and help students consider greater details about problems, situations, and events they would encounter in the field (Floyd & Bodur, 2006). In this study, students benefitted from both formats, but preferred video. Video formats have been shown to help pre-service teachers apply conceptual knowledge and see multiple perspectives (Goeze, Zottmann, Vogel, Fischer, Schrader, 2014), understand classroom management skills, (Tal, 2010) evaluate classroom teaching situations, (Siedel, Blomberg, & Renkl, 2013) and reflect on their own practices (Masingila & Doerr, 2002). Video cases are most effective when embedded in instructional contexts with clear goals and learning purpose (Blomberg, Sherin, Renkl, Glogger, & Seidel, 2011), as demonstrated in this study.

The professor accessed videos and created written cases that were not time-consuming to prepare. While case studies should continue to supplement field experiences, instructors may need to utilize these more intentionally if field experiences are interrupted intermittently or completely in situations such as COVID-19. Emerging evidence shows case study simulations can replace at least part of the traditional field experiences and provide meaningful learning (Chu, Sheppard, Guinea, & Imms, 2019; Kennedy, Jewell, & Hickey, 2020). Providing students quality alternate experiences can keep them on track for degree completion while building critical teaching skills.

FUTURE RESEARCH

While case studies can be effective in providing meaningful learning experiences reflective of those in the field, more research is needed to determine the extent to which case study analysis translates to improved implementation in later field experiences. In this study, case studies were of multiple children in different scenarios which provided a larger range of experiences; however, case studies of one or two children who "grow over time" would allow a more in-depth analysis. Research could compare the effectiveness of these case study types to determine their effectiveness under specific conditions. Finally, given that video cases are not always available for key objectives, instructors may want to consider low-cost ways to create simple videos that represent the scenarios they want students to experience and then test these to see if they produce the intended results.

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APPENDIX

COVID-19 Student Survey (Note: The professor used Qualtrics software because this is what the university used; however, any survey software (e.g. Survey Monkey) could have been used.

Hi Students!

I know that this is a really strange semester with COVID-19. I would really like to hear what is working and not working and how all of you are doing. I have prepared a quick Qualtrics Survey to learn more about how COVID-19 is affecting you related to this class. I also want to know what might help future classes like this in case we are still having to teach remote in fall. Thank you.

Please rate the following 1-6 questions
Strongly Agree   Agree   Neutral   Disagree   Strongly Disagree

1. I feel I was well informed about what I needed to do to successfully complete the course

2. The course assignments and deadlines were reasonable to complete via remote learning

3. I was able to communicate (zoom, email, phone call, etc.) with my instructor when I needed.

4. I had a variety of learning materials available such as videos, writing journals, online reading, discussion boards etc. to keep me engaged in my learning.

5. I feel the instructor adjusted the course (deadlines, assignments, etc.) to maximize learning remotely.

6. The transition to remote learning was smooth.

What would you like to tell me? Please write your answers below:

1. What learning activity or materials did you benefit the most from during remote learning?

2. What else would you like to tell me to help me understand your experience transitioning to remote learning during COVIDE-19?

Video Instruction Transparency During COVID-19:
Modeling for Preservice Teachers

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Preservice teachers are observing the actions and decisions their instructors are modeling in how to adapt face-to-face instruction for distance learning. Instructors of preservice teachers have a unique opportunity to provide transparency in their decision-making and action process as they shift their practices online. This article focuses on a single instructional method (delivery of content through video) and offers nuanced strategies based on first-hand experiences for asynchronous and synchronous video creation, and how to invite preservice teachers into the discussion. Implications include strengthening teacher identity, opportunities for reflective practice, and engaging in actions that have the potential to better equip preservice teachers for any future uncertainty.

INTRODUCTION

Preservice teachers wear roles as both 'student' and 'teacher' experiencing the instructional response of COVID-19 from both perspectives. These future educators are observing the actions and decisions their instructors are modeling in how to adapt face-to-face instruction for distance learning. We know that teachers are more apt to teach in the ways they were taught (Lortie, 1977) and the beliefs they hold about technology directly impact the likelihood of incorporating them into their practice (Ertmer & Ottenbreit-Leftwich, 2010). Therefore, by providing transparency into the process, the implications are far-reaching. In this unprecedented time of COVID-19 and abundance of digital learning, many educators are taking advantage of asynchronous and synchronous video capabilities as a way to continue delivering high-quality content to preservice teacher educators. This presents an opportunity to model and guide preservice teachers' professional identity development, specifically concerning distance education. Video affordances include interactive elements (Zhang, Zhou, Briggs, & Nunamaker Jr., 2006) and video as instruction has resulted in performance increases, student engagement, and self-regulation (Delen, Liew, & Willson, 2014).

INNOVATION

With many K-12 education environments opting to use video as a way to respond to the COVID-19 challenges of moving education online, more than ever before preservice teachers need to understand the technical and pedagogical considerations of video instruction in order to be prepared for future distance learning. In addition to the resources that various organizations, institutions, or professional affiliations offer (see: Ells, 2016; Wan, 2020), providing pedagogical scaffolds are necessary for preservice teachers.

Asynchronous Video

In the majority of online learning environments, asynchronous communication is the dominant strategy. In my courses I provide pre-recorded videos for students to watch on their own time that are bite-sized chunks to reduce overall cognitive load (Mayer & Pilegard, 2005). Shorter videos. In creating multimedia, I limit the use of a combination of mov-

ing images, audio, and text (Butcher, 2014). I often include instructor presence in the form of picture-in-the-picture for simpler concepts (J. Wang & Antonenko, 2017), ensure that the length of the video matches the goal (Whatley & Ahmad, 2007), and match the style of the content to my natural instructional style (Hansch et al., 2015). Also, as I spend time creating videos, I consider how I can ensure the longevity of the recording.

I stress to my preservice teachers that it is not always efficient to reinvent the wheel; platforms like YouTube, Vimeo, and Teaching Channel may already offer some of the same content I plan to record. Further, I emphasize using tools such as EdPuzzle, PlayPosit, VideoANT, Vialougues, MoocNote, Vizia, and Camtasia to combine pre-existing videos with my unique commentary, and also utilize the interactive assessment features to check for understanding. Giving future teachers experience gathering content and creating short videos with built-in assessment strategies provides opportunities for instructors to situate instructional technology into pedagogical meaningful ways rather than providing tool-specific instruction (Koehler, et al., 2014). Additionally, it is important to note equity issues, taking into account accessibility (e.g., ensure that the content is not solely accessible through the audio within your videos) and access (e.g., mobile devices, in rural areas, or when the internet is overloaded) to online content. To make my process visible, I have provided candid opportunities to model my reflective process for multimedia creation. This has been rewarding and resulted in plans to extend this practice for preservice teachers to consider their own experiences.

Synchronous Video

Synchronous video options are offering many teachers and instructors a way to connect (Kear, 2011; Palloff & Pratt, 2011) with their students to provide a level of comfort and support (Y. Wang & Chen, 2007) that is needed during these ever-isolating times. Platforms like Zoom, Microsoft Teams, Google Hangouts, and Meet, among others, are exploding. However, with the influx of users, we see many growing pains. Security issues are an ever-present concern resulting in many platforms being banned or reconsidered (Strauss, 2020). Privacy considerations are another topic that has recently been brought to light in conversations about educating online; however, in fields bounded by privacy laws, this is not a new challenge (see: Lorenz, 2020, and Rios, Kazemi, & Peterson, 2018). And while the almost daily news stories of video conferencing fails are a moment of levity in this dark time, these issues call for institutions to provide not only technical training but how to navigate the digital format professionally (see: Vincent 2020). Within my practice, these stories have provided opportunities to learn from the mistakes of others through rich discussions regarding online discourse using video methods.

Synchronous communications are offering K-12 educators' opportunities for live instruction in the digital context and many teachers have not been prepared for this shift. Preservice teachers need to practice using digital technologies to instruct in a virtual context. When conducting live sessions, I provide guidance and scaffolds that bring to light considerations preservice teachers should be making when instructing in an unpredictable environment. Within my live sessions I start by establishing a code of conduct or guidelines for online communication (Gautreau et al., 2012; Shea, 1994) and emphasize to preservice teachers not to assume that your participants will understand and apply the same levels of classroom behavior. During formal instructional sessions, I plan as I would in face-to-face instruction for productive meetings (Gautreau et al., 2012) (see appendix A for example agenda of a synchronous session). To help facilitate discussion, I have implemented Roblyer's (2015) recommendations for establishing roles for both instructors and students. This has not only helped with the flow, but the inevitable digression that can occur online.

Additionally, I stress technical concerns when conducting live sessions. Simple actions can reduce audio issues (e.g., using a headset or microphone, muting your microphone when you aren't speaking) and can aid in transferring technical knowledge in the future. Additionally, being cognizant of students that may need information slowed or repeated (e.g. ESOL) is an important factor to make visible to future teachers. It is essential to consider what is seen in the camera frame and how preservice teachers will be seen by students and their parents. I have modeled and facilitated discussions in my courses to bring to light these subtle, yet important details during live sessions (see student reminder of live session considerations in appendix B).

IMPLICATIONS

Incorporating opportunities to transparently examine and model the capabilities, benefits, and challenges of video instruction is just one way instructors of teacher educators can begin to prepare preservice teachers for future dis-

tance learning instruction. Providing opportunities for professional reflection on these experiences aids in establishing a "teacher's voice" (Sutherland, Howard, & Markuskaite, 2010), and incorporating reflective practices aids in learning and development as a teacher (Shulman & Shulman, 2004). In response to the COVID-19 shift to solely distance learning, I have been more purposeful with integrating opportunities for future educators to reflect not only on the content but also on the technical methods that are used for instruction (see reflective prompt using FlipGrid in appendix C). Professional identity begins as a preservice teacher, and part of forming that identity is engaging in opportunities to build and challenge their experiences and beliefs (Walkington, 2005). The shift to distance learning provides preservice teachers with a perhaps greater ability to reflect on these unprecedented pandemic responses. Morgan, Rawlinson, & Weaver (2006) report that participants reflect longer in an online environment. Additionally, student engagement is supported by the overall design of the online environment (Lin, Hmelo, Kinzer, & Secules, 1999). Through this pandemic preservice teachers are not only able to consider their pedagogical practices, but have the ability to reflect, assess, and challenge their technical knowledge and skills more robustly.

FUTURE WORK

Video is just one instructional method where teacher educators can provide greater transparency into the instructional process. Teacher educators can easily select other unique and relevant instructional methods and choose to make the process visible. Examples might include facilitating online discussions through text-based applications rather than traditional classroom conversations or how best to provide formative feedback that is responsive and just-in-time in the online space. Making direct connections to how instructional content is delivered remotely has the potential to better equip preservice teachers for any future uncertainty.

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APPENDICIES

APPENDIX A

Synchronous Session Agenda

Day of the Oral Exam

~1 minute	**Introduction** • Your name, where you are from/live, current work environment, when you entered the program, a fun fact
10-15 minutes	**Artifacts** • Present 3-4 artifacts in your portfolio that demonstrate growth in the program • Done through screen sharing
5-7 minutes	**Reflections** • Summarize • WHAT have you learned? • HOW have you learned? • Something UNIQUE or UNEXPECTED in your learning • Done through screen sharing
10-15 minutes	**Questions** • We tend to stick to the questions listed in BB, but it could be anything

Synchronous Session Student Considerations

During your presentation

1. Arrive early to test technology

2. Consider your background
     a.   What is seen in the frame? Is it professional?

3. Use notes but not a script for a natural voice

4. Speak slowly- use rich, specific descriptions

5. During questions when you are unsure—
     a. Pause
     b. Use your portfolio to help aid your answer
     c. Be honest rather than trying to make something up

▶ You will need a quiet place during your live session

   ▶ We recommend being on a computer you are comfortable with, has good audio and video, and good network speed.

   ▶ You should check your computer for video conferencing diagnostics prior to our live session.

   ▶ We recommend a headset with a microphone, but at the minimum you should have ear buds.

   ▶ Mute your audio when you are not speaking to minimize noise.

   ▶ Remember, should you need a moment of privacy, make sure to "stop video" rather than "hide myself" (You aren't hiding- we can see you)
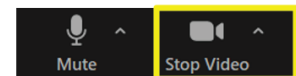
Discussion prompt using FlipGrid reflecting on distance learning

Diving into the Depth of Online Learning: How Pre-Service Teachers Leverage Technology during the COVID-19 Pandemic

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Despite the rapid surge in full-time virtual schools across the nation, few teacher education programs address online teaching and facilitation competencies or offer virtual field experiences. With the sudden physical closures of schools due to the COVID-19 pandemic, such competencies are even more critical as pre-service teachers (PSTs) suddenly find themselves teaching online. This research brief describes the process of one teacher educator's weekly PST sessions as they rapidly transitioned to an online setting. Detailed are how Padlet discussions, Poll Everywhere, and timeless favorites of Bingo and Show and Tell were implemented to enhance Technological, Pedagogical, and Content Knowledge (TPACK). Guided by the Community of Inquiry model, the pedagogical shift used during the new online sessions supported and modeled interactivity and social presence during synchronous and asynchronous activities.

Keywords: Pre-service teachers, online teaching, pedagogy, social presence, synchronous, asynchronous, games, Science education

INTRODUCTION

Daily placement routines came to a halt in mid-March 2020, impacting teachers, pre-service teachers (PSTs), and at least 55.1 million American students ("Map: Coronavirus and School Closures," 2020). The rapid and unprecedented rush towards online instruction disrupted weekly face-to-face meetings among PSTs and their teacher educators on college campuses. As a means to promote Technological Pedagogical Content Knowledge (TPACK), I employed non-traditional strategies during the remaining semester meetings with my ten Science Education PSTs. By moving away from traditional pedagogies of lecturing, I strove to develop the PSTs' familiarity with online collaboration, flexibility, initiative, and other 21st century skills in order to direct them away from what Reeves (2003) calls "the poverty of pedagogical innovation" in online settings (p. 3).

INNOVATION

Interactive Polling. Reviewing weekly journal reflections of each PST's placement experiences provided rich fodder for discussions. During one meeting, survey questions pulled from reflections were entered into the free, live audio-response system Poll Everywhere (https://www.polleverywhere.com/). Rich conversations ensued after students viewed the immediate results from the survey. Some of the questions asked were:

Anyone using Instagram or Twitter for science class?
Do you know how to place a timer on Google Forms?
Do you know of any good virtual simulations on whale evolution?
What are some resources for coral bleaching?
Have you tried Wevideo?
Do you use iBooks?
Can you recommend any good videos on the flu, viruses, and vaccines?

Addressing topics using a poll platform offered PSTs "the opportunity to collaborate distantly while connecting on a more engaging and communal level" (Jones & Sylvia, 2011, p. 389).

Asynchronous Online Bulletin Boards. During one online session where students were offered the flexibility to complete their discussion asynchronously, PSTs clicked on a link to the bulletin board Padlet (https://padlet.com/). Students used this colorful board to share strategies on grading efficiently and ways to encourage high-school students to take their time to complete assignments. A little less linear than typical discussion forums, Padlet and other cloud-based platforms such as Nearpod, Pear Deck, Voice Thread, and Twitter offer a dynamic "collaborative space to communicate through video, voice, and text commenting" (Vakil, 2018, p. 1446).

Show and Tell. The childhood favorite Show and Tell is "an interaction used to provide content information to students" (Kho & Fricke, 2009, p. 220). PSTs eagerly volunteered to share their favorite multimedia tool or tech-supported creation. One student displayed his green screen production, another discussed the instructional video she created for solving stoichiometry problems. With most of the students taking on the new responsibilities of video-recording lessons, the activity led to an exchange of information on various inexpensive recording software. Another student discussed how she regularly used the online tool EdPuzzle (https://edpuzzle.com/) for her students' video viewing assignments. EdPuzzle allows teachers to edit, crop, add audio commentary, insert quiz questions on content, and track students' viewing time and progress (Graham, 2016).

Also during this session, a PST talked about questions on Hooke's Law she adapted from the lesson sharing section of the PhET Interactive Simulations website (https://phet.colorado.edu/). Another PST demonstrated click by click how his students navigated through the inquiry-based interactive modeling site Virtual Biology Lab (http://virtualbiologylab.org/), where they learned about population genetics. Similarly, one PST shared how her advanced biology students entered a virtual precision medicine lab on the Decoding Cancer site (https://www.decodingcancer.org/resources).

B-I-N-G-O. Games such as Bingo can "generate excitement among students and motivate them to participate" (Jackson, Taylor, & Buchheister, 2013, p. 424). Used as concept review, "'Gamified' active learning has been shown to increase students' academic performance… and help them make more social connections than standard course settings" (Chen, Huang, & Gribbins, 2018, p. 41).

Bingo was employed as an entertaining final event for our last meeting of the semester. Students were each emailed the same 5x5 board infused with science puns and references to past classes. PSTs were instructed to rearrange a few of the boxes in order to personalize their board. As shown below (Figure 1), the Bingo calls were initiated by real-time actions, perfect for synchronous video conferencing. When one student was spotted drinking from a water bottle, PSTs were allowed to mark the box "hydrophilic action." Or when loud noises could be heard in the background, PSTs marked the box featuring an amplified sound wave.

PST Science BINGO

Someone sharing a positive experience (image of a cat and a positive sign)	Pet or sibling noise in the background	Person walks in background	Shouting in background (image of amplified sound waves)	Random Echoes (image of sound waves)
Someone says "I don't know"	Lots of chat box $p = mv$	Student dozing	Someone is eating pizza without a (image of periodic table)	Someone being hydrophilic
Someone consuming (image of caffeine compound) in any form	Video off	(Image of Einstein's theory on space and time = Free Space)	See a well-organized Virtual background (Image of a planet, since the background is well-planned)	Someone is not able to share screen
Awkward absence of ambient audible sound	$KE = \frac{1}{2} mv2$	Someone's face is covering his/her entire screen	Good-bye Group photo (image of a "cell-fi" cell holding a cell phone)	Experiencing "Awe-smosis" (image of meme - definition and test tubes)
Anyone discussing a movie they plan to watch (image of a meme about "Bond, Ionic Bond")	New Science Tic Toc move	Someone starts talking on mute	Alone at home (image of meme featuring a helpless T cell saying "antibody out there?")	Discord during class (image of a meme - yogurt holding up a sign that says "Probiotics" and a pill container holding up a sign that says "Antibotics")

Figure 1. Science themed Bingo board used during a synchronous online weekly meeting.

RESULTS

Replication of the sessions described in this brief contains three components: (1) a connection to a homework assignment, such as a weekly journal reflection about the PST's placement site; (2) the application of technology or a multimedia site, for example engaging students in gamified learning, polls, a variety of discussion platforms, and opportunities such as Show and Tell; and (3) the opportunity for PSTs to share knowledge of teaching strategies, behavioral management, grading systems, websites, and other digital tools. Initial findings from these online practices have shown an increase in engagement and discussion participation.

PSTs spend a full-day as interns in schools, or in this climate, hours online communicating with students and mentor teachers, creating virtual assessments and videos, grading assignments, and responding to emails. Staying in the virtual environment to attend an evening session can be enervating. Modeling interactive online activities and prompting students to use a wide variety of synchronous and asynchronous platforms livens and enriches discussions about the field. The TPACK framework (Mishra & Koehler, 2006) stresses the technological competence required as instructors integrate rapidly evolving digital technologies that "disrupt the status quo, requiring teachers to reconfigure not just their understanding of technology but of all three components" (p. 1030) Using the TPACK strategies described above supports PSTs cognitively and allows them to foster strong community connections with their fellow teaching cohort (Garrison,

Anderson, & Archer, 2000). Building more of a social presence is particularly important during a time of a national emergency where PSTs face the challenges of a new online setting (Hawkins, Barbour, & Graham, 2012), worry about the current economic uncertainty, and endure psychological pressures of social dislocation (Kamenetz, 2020).

IMPLICATIONS

Full-time virtual schools are on the rise (Molnar et al., 2019) and online learning is "one of the fastest growing phenomena in K-12 education," (Rose & Blomeyer, 2007, p. 2). Despite this surge, only 4.1% of teacher education programs responding to a national survey report offering virtual field experiences (Archambault et al., 2016) and few programs address online teaching and facilitation competencies (Davis et al., 2007). Archambault et al. (2016) captured the perspective of one respondent who felt that online field experiences do not provide adequate preparation for teacher candidates, resonating with administrators who remain "unconvinced" (Faulk, 2011, p. 27) and hold negative perceptions concerning online teacher programs (Huss, 2007).

Implications of this brief indicate the urgent need for teacher education programs to rapidly revamp long held approaches towards instruction and develop courses and curriculum that address teaching and learning in the online environment. Classes and regular weekly meetings should address best practices for teaching online to better prepare PSTs as they become not only a teacher, but also a course facilitator, instructional designer, local key contact, mentor, technology coordinator, guidance counselor, and administrator (Ferdig et al., 2009). There also needs to be a shift in the current mindset which engenders suspicion towards online education as an "inferior" (Connolly et al., 2005a, p. 2). With remote learning now more of a norm during the pandemic, an emphasis on its affordances will prove more beneficial in advancing teacher education.

Additionally, the roles of instructors and students need to be re-conceptualized (Regan et al., 2012). The instructor should prioritize the social responsibility of building a learning community while "establishing a culture for productive interaction" (Easton, 2003, p. 90). The instructor should take time to check-in with the wellness of students as a means to model how PSTs need to be sensitive to the population of adolescents they serve, particularly since they have been deemed susceptible to responding "more strongly to the stress of a crisis" (CDC, 2020). By decentralizing the role of instructor and empowering PSTs by giving them opportunities to demonstrate their technological expertise and share their virtual experiences in their new remote instructional settings, future teachers will be better prepared to handle the challenges in adapting to online teaching and supporting their own students with online learning.

FUTURE RESEARCH

The sessions described in this brief capture how creating a more dynamic discussion- based online class, infused with demonstrations of technology that can enhance instruction, support PSTs who may otherwise remain stagnant within the traditional, direct forms of learning or drown in the vast options of online tools and pedagogies. Additional research in the decision making process of how teacher educators select which technology to model in class or how PSTs choose online tools for their own students may inform platform and multimedia developers, as well as administrators as they plan for professional development workshops. One topic that resonated with many frustrated PSTs in my class concerned how to attract their students to the virtual office hours offered at their placement site. Future investigations on how teacher educators can model best practices for engaging PSTs in such optional virtual hours can contribute to furthering student academic support.

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Preservice Teachers' Use Design-based Research: Learning to Tutor Online During COVID19

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University reading clinics provide inexpensive tutoring as a service to the community as well as serving as a supervised teaching practicum for preservice teachers. They also serve as a research lab for developing promising practices. As preservice teachers were becoming more and more proficient in their one-to-one teaching, all courses and our practicum moved online as a result of the COVID 19 pandemic. Our group of 17 preservice teachers and their instructor became a learning community engaging in design-based research using new tools to continue to serve our K-8 students. Several of these preservice teachers emerged as champions of the process and became class experts as well as trailblazers in this work. They share their resources and recommendations for online tutoring through a university reading clinic.

INTRODUCTION

University reading clinics provide inexpensive tutoring as a service to the community for learners who struggle as well as serving as a supervised teaching practicum for preservice teachers. They also serve as research labs in which faculty and students explore innovative ideas and interventions with the intent of developing new, engaging, and effective literacy processes and strategies (Laster, 2013; Vasinda, Kander, & Redman-Sanogo, 2015). This practicum is often the first experience applying previous course knowledge to an authentic, unique, and complex context placing preservice teachers (PSTs) in a teaching role with support from faculty. It provides a design-based opportunity for learning the complex, interrelated domains of teaching (Kolodner, 2002; Reeves, 2006), including the continued development of content knowledge, pedagogical knowledge, the intersection of content and pedagogical knowledge (Shulman, 1987), and, more recently, technological knowledge, or TPACK (Koehler & Mishra, 2008). The COVID-19 pandemic created the most unique context during the Spring 2020 semester when PSTs and their instructors became a learning community and researchers grappling with the question: How would our teaching and learning change in an online context?

INNOVATION

When the university decided to remain online, our tutoring practicum was little more than half complete. Clinic leadership emailed a survey to families to determine interest in continuing tutoring virtually and what kind of access to technology they had. With a 60% response rate, all responding families desired to continue tutoring in this unexplored

virtual space. In this class, 12 PSTs continued tutoring their tutees synchronously online, and five created a series of video lesson plans with their former tutees in mind.

PSTs learned a variety of assessments to determine their tutee's strengths and needs in reading, word study, and writing. Following a Response to Intervention model, they used the assessment data and subsequent observations to plan three weekly lessons addressing each literacy component. They used two models to plan and implement instruction: a mini lesson framework for reading and writing (Calkins, 2001) and an analytic approach for word study (Bear, et al., 2016). Lesson plans were created in a Google Doc template supporting these teaching structures and for ease and flow of instructor feedback. Additionally, each PST had a university-issued iPad to support technology integration.

In response to the need to teach online, the instructor created an online teaching resource module (Figure 1) in the learning management system (LMS) starting with a video conferencing checklist for zoom.us. To support the mini lesson structure, she chose a free, simply structured resource developed specifically to address the distance-learning context (Ziemke & Muhtaris, 2020a). To support the analytic approach to word study, she chose two simple YouTube videos demonstrating how to construct digital word sorts with Google Drawing. She also included free resources to access free digital texts and resources to support the digital learning journal app, Seesaw. After some guided exploration of the resource module, they shared questions and concerns and planned their first lessons. They were encouraged to practice video conferencing with each other prior to their first of three virtual sessions. There was nervous anticipation in which everyone wondered, "How will this work?"

Figure 1. Online Teaching Module from LMS.

RESULTS

As part of their regular reflection process, the PSTs use TPACK as one criterion for self-evaluation of growth. They used FlipGrid videos to make their reflections public to the group for knowledge sharing during these three weeks. COVID Week 1 yielded mixed results from Morgan's lament of "It did not go well at all. I got off and wanted to sob." to Emmy's surprised response of "It went really well!" Many expressed technical or engagement frustrations of some type. Even though aspects of the first session were challenging for most, each had pockets of success and several developed expertise in some aspect of TPACK (Table 1).

Table 1
Expertise that Emerged After First Online Session

Expertise Shared	Preservice Teacher
Adding parents or partners to SeeSaw	Brianna
For Mac users: sharing your iPad screen as a white board	Tara
Using EPIC digital books	Kayla
Using iMovie and posting to YouTube	Ashley
Finding new digital resources	Hailey
Raz-kids hack for finding/hacking texts on DRA levels	Emmy
Hyperlinked Lesson Plan	Jatelyn

Serendipitously their online learning module between COVID Week 1 and COVID Week 2 focused on strategies to support English Language Learners (ELL). The resources for the Total Physical Response (TPR) approach included on-line teaching tips from a successful commercial model, VIPKids. Watching lesson demonstration videos for TPR resulted in effective online teaching practices, too. Even PSTs who did not tutor ELLs found the online teaching techniques helpful. All PSTs made significant changes from COVID Week 1 to COVID Week 2 developing more expertise and sharing more resources. Morgan, in particular, found great success using TPR and the online teaching tips for her six-year-old ELL. She developed her own version of this approach, and her reflection from Week 2 was positive and enthusiastic. Kayla found a combination of synchronous and asynchronous teaching better supported her reluctant writer and helped her form a partnership with the parent, which would not have happened by tutoring in the clinic. By COVID Week 3, which was the last week, many expressed a desire to continue because they felt like they were just figuring out how to make this process work well.

IMPLICATIONS

PSTs' responsive teaching became design-based research (Reaves, 2006). They analyzed practical problems in terms of resources, materials, tools, and techniques. They developed solutions, implemented them and tested them. They reflected and refined their TPACK in an integrated way that informed each of the three weeks of this experience. Although their recommendations come from a state of "emergency teaching" (Ziemke & Muhtaris, 2020b), they could be applied to a more proactive and planful approach, as follows.

Support online teaching with familiar structures. Changing the teaching context from face-to-face to online added additional learning opportunities and challenges. Therefore, course instructors need to support PSTs' exploration of digital tools within familiar structures (Brooke & Carreker, 2020; Ziemke & Muhtaris, 2020a, 2020b). Starting with a small set of resources based on familiar structures and strategies made the transition to online only a study of digital tools. Demonstrating how familiar analogue tools, such as picturebooks and paper anchor charts, work in digital spaces work in online teaching helped PSTs discover that their course resources were easily adapted to online instruction and reduced cognitive load.

Create a learning community for collective efficacy. This community focused on continuing to tutor online and shared their learning with each other through Flipgrid video reflections to share discoveries and support each other. They shared resources and strategies as small hyperlinking digital resources in lesson plans for smoothness to new resources and other online communities of learners to follow (Table 2). Teacher educators should highlight the successes of individuals and add the additional resources to the online teaching for point-of-need support (Table 3). Everyone's individual growth contributed to the collective growth of the group, or "collective efficacy" (Bandura, 1997, p. 477). Bandura found that when groups of individuals believed they could work together to overcome challenges to meet shared goals, they could, and they did. Bandura also found that collective efficacy was more effective than the individual's efficacy. Hattie and colleagues found Collective Teacher Efficacy as a top influential strategy for student success (Donohoo, Hattie and Eells, 2018).

Table 2

Preservice Teachers' Recommendations of Groups to Support Online Teaching

Social Media Teacher Groups	Rationale for Sharing
Distance Learning for Upper Elementary Teachers	I love this page because it posts tons of tips for all platforms, but I wanted to share this resource I found that I am going to explore more for Seesaw. I would like to see how this type of activity could work with our tutees!
Flipgrid Educators	I found this one late...I'm telling you that I WISH I had found this earlier. This group had a ton of learning ideas I'd never heard of!
Seesaw Teachers	Just joined this one, but there was good information about how to do read-alouds (using Loom) and other awesome ideas if you use Seesaw.
Teachers ask Teachers	There are many Zoom tips and tricks in this group. It also has a lot of general tips and tricks for new teachers, and a lot of pre-service teachers are also involved in the group.
Teachers Using Google Classroom/*Google Classroom for Teachers*	This might actually be another way you can create an online community like in Seesaw for tutoring. I also knew that I would be using GC when I student teach next semester, so I wanted to get a jump on trying to understand all the features. You can create a GC with any google email account, but we may have to have permission to use GC at OSU.

Table 3

Expanded Online Teaching Module from LMS with Links

Mini Lesson Support	
Read the World Distance Learning Support	https://sites.google.com/view/rtwdistancelearning/home
Word Sort Support	
Create a Word Sort in Google Drawings~ Edtech Awesomeness	https://www.youtube.com/watch?v=saQcGV_339I&t=98s
How to Make a Digital Card Sort~ From Blended Classrooms	https://www.youtube.com/watch?v=ThLmoE-lsgc
Create an Activities in SeeSaw~ Marie Henderson	https://www.youtube.com/watch?v=r-MTXGlIb0g
Online Books and Reading Material	
Epic Online Books Free Account	https://www.getepic.com/
Epic Free Remote Access for Parents~ Brad Dale	https://www.youtube.com/watch?v=7JQLf7gfaO0
Raz-kids	https://www.raz-kids.com/
Reading A-Z (free trial)	https://www.readinga-z.com/
Time for Kids (free through July)	https://time.com/tfk-free/
Scholastic News Learn at Home	https://tinyurl.com/u2n97f8

SeeSaw Digital Learning Journal	
Remote Learning for Teachers New to SeeSaw	https://tinyurl.com/yagdah4q
Create Your First SeeSaw Activity	https://www.youtube.com/watch?v=60pz4Hw1XcE
Remote Learning Guide	https://web.seesaw.me/remote-learning-for-teachers
Strategies for ELL	
How to use TPR in the Online Classroom VIPKid	https://www.youtube.com/watch?v=QT-hM5rrC0w
TPR Classic Model	https://www.youtube.com/watch?v=1Mk6RRf4kKs&t=113s

Understand Teaching [Online] as a Risk-taking Practice. Change involves risk (Le Fevre, 2015), and teaching in every context is a practice. The instructor started the semester making her teaching practice challenges and goals transparent (learning a new LMS and exploring the Seesaw digital learning portfolio). She emphasized that their learning community was a safe place to take risks and make mistakes. Even our video resource encouraged living with imperfection and making "one-take videos" learning from each one how to make the next better (Ziemke & Muhtaris, 2020a). Many practiced their first zooms with each other. Some experimented with flexibility of structures using both synchronous and asynchronous lessons. Celebrate each success and problem-solve each challenge together.

Balance Academic Learning with Social-emotional Learning. Focus first lessons on social-emotional learning and connecting (Ziemke & Muhtaris, 2020b). Continuing genuine care was key in this online learning pivot. PSTs' initial priority was ensuring their tutees felt a sense of normalcy during the chaotic time while maintaining the same learning goals. Therefore, keeping familiar formats of the in-person lessons helped reconnect and move forward. They used digital books, digital word sorts, and SeeSaw's digital learning journal for writing. Their explorations of additional resources and strategies were guided by the learning needs of their tutees. Even tutors who created asynchronous videos for tutees whose families did not respond did so with their tutee's social-emotional and academic needs in mind.

FUTURE RESEARCH

Recommendations from this group have informed the work of the instructor as she plans for the same course this summer, where this research will continue. Using their recommendations, she started tutoring a second-grade student online between semesters to explore how to begin the tutoring process online from initial engagement, assessments, and instruction. She started blogging this process in response to requests of support from other university colleagues facing this same online reading clinic challenge (https://sherivasinda.weebly.com/thought-smashing-blog), and PSTs are guest bloggers. They have more stories of successes and challenges to tell and perceptions of the parents and tutees still need to be explored. The summer online tutors will follow the path started by these trailblazers and will continue smoothing and widening it making the way easier for those who follow.

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I Never Thought Quarantine Would Take Me All over the World

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Written from the perspectives of an elementary social studies methods instructor and a teacher candidate, this brief summarizes the early results of World Ed Chats between quarantined Midwestern teacher candidates and educators from the Middle East and North Africa. Informed by intergroup contact theory (Allport, 1954) this weekly videoconferencing activity seeks to build cultural literacies and disrupt dangerous stereotypes and narratives. Participating teacher candidates report appreciation for mentorship received through the chats, shifts in global understanding, and mental health benefits. Through the World Ed Chats, we learned that 1) People participate for both shared and different reasons that ranged from meeting social needs to practicing conversational English; 2) We can leverage all components of the activity for building cultural literacies, for example scheduling during Ramadan; and 3) We must approach teacher candidates and international participants as collaborators if we wish to engage in justice-oriented work.

INTRODUCTION

Prior to classes moving online, our traditional on-campus elementary social studies methods course had few opportunities for global engagement. However, the transition to distance learning introduced us to platforms such as Zoom and possibilities for teacher candidates to connect with educators around the world through what we called World Ed Chats--weekly videoconference exchanges of experiences and ideas between quarantined teacher candidates in the Midwest and educators from the Middle East and North Africa.

In our positions as an Assistant Professor (the instructor for this course) and a teacher candidate at Missouri State University (MSU), we enter courses with people who share similar cultural backgrounds. Many are white, first generation, female students from working class families. Our K-12 educations were marked by nationalistic narratives of citizenship (Bohan, 2005; Nelson, 1976; Westheimer, 2007; 2011), an exclusion of Arab and Muslim peoples from curriculum (Haste, 2010; Subedi, 2010), and media that portrays Arab and Muslim peoples through dangerously dehumanizing caricatures (Beinin, 2010; Said, 1978, 1980; Sensoy, 2010; Shaheen, 2012). Additionally, students of traditional age were raised in the shadow of 9/11 and Islamophobia. Though studying with educators who work towards equity and justice, students in the Midwest still regularly encounter "diversity deserts" and toxic narratives regarding Arab and Muslim peoples (McCafferty-Wright, 2016). We hoped to disrupt these dangerous narratives through the World Ed Chats.

INNOVATION

Intergroup contact theory influenced our approach to the World Ed Chats. Born of research conducted on integrated units from WWII, intergroup contact theory (Allport, 1954) seeks to erode stereotypes and prejudices. Specifically, the World Ed Chats reflected the *mutual intergroup differentiation model* (Brown & Hewstone, 2005; Hewstone & Brown, 1986) which accounts for intersectional identities while supporting shared goals.

With our quarantined lives in mind, the instructor created a weekly experience for teacher candidates to interact with

educators throughout North Africa and the Middle East. The international participants for World Ed Chats were recruited through previous research and education contacts in Morocco and Egypt who then shared invitations with colleagues in their own and other countries. Teacher candidates who participated in at least three World Ed Chats wrote a reflection paper to fulfill a course assignment option.

The Zoom meetings occurred on a scheduled day and time each week and lasted for one hour. Afternoons worked well for our MSU class schedule and provided enough time for participants celebrating Ramadan abroad to participate in prayers and breaking their fast with family members. During the first few meetings, we developed a reliable format (See Sample Script at the end of this section). The instructor/facilitator:

1. Welcomes people as they join, assigns teacher candidates as cohosts through the Zoom participant menu, and makes announcements
2. Introduces three prompts (See Table 1 for sample prompts)-- A) An icebreaker related to personal identity and experiences, B) A discussion question related to education and/or culture, and C) A request for the breakout group to craft a statement to share with the large group

Table 1
Sample Prompts

Prompt 1	Prompt 2	Prompt 3
If you could describe your day using emojis, what would it look like? What would your perfect day look like? If you could take a trip anywhere, where would you go, and who would you take? What interesting thing happened today? What small, good thing happened to you today? What do you hope to be doing in five years? Why? What advice would you give to yourself last year?	If you could have everyone's attention for five minutes, what would you say or do? Why? What do you want students and teachers in other countries to know about your country and your culture? What do you like about where you live, and what would you change? How can we learn and teach about places we've never been to and people we've never met? Describe your favorite teacher. How did you feel in their classroom?	What from your breakout room do you most want to share with the large group? Create a summary statement together, and select a participant to share it.* *This prompt remained the same every week.

3. Assigns participants to breakout rooms through the Zoom menu to discuss the prompts, adjusting room assignments to include relatively even distributions of MSU participants to international participants
4. Visits each breakout room for a few minutes, thanking people individually for joining, and monitoring for people who need room assignments because they joined late or rejoined after losing WiFi
5. Calls all breakout rooms back to the large group ten to fifteen minutes before the end of the hour
6. Links and frames participants' final statements from their breakout rooms
7. Concludes with reminders, announcements, and well wishes

Because participants were differently affected by the pandemic and had inequitable access to resources, we recommend flexibility with all parts of implementing World Ed Chats. For example, attendance was always optional. Additionally, the nature of our international recruitment required an open link. Because of this, teacher candidates shared power and responsibilities as cohosts to potentially mute and remove harassers so we could maintain a safe online environment. Luckily, we did not experience harassment problems or what has become known as "Zoom bombing". Assigning several teacher candidates as cohosts also permitted the chat to continue when the instructor/primary host lost WiFi and needed to rejoin the chat.

Welcome to our Wednesday World Ed Chat. Hello. As-salamu alaykum. Bonjour. Përshëndetje. Thank you for joining us! I'm Dr. Jennice McCafferty-Wright, and I teach in the College of Education at Missouri State University.

I need to acknowledge that we are all working from home during a global pandemic. We are with families and pets, so please do not apologize if you are interrupted by life. These are circumstances we cannot control. Also, we cannot control the WiFi. If you lose connection, you are welcomed to return to the chat. Finally, I cannot hear calls to prayer from my country, so please let us know if we need to take a 15-minute break. If so, we will add the time to the end of our meeting.

Please click on the chat button to tell us where you are from and what you do. Are you a student? Teacher? Teacher trainer? NGO worker, etc. (Facilitator reads many of the responses and personally welcomes people)

You can find today's discussion prompts in the chat. Soon, I will divide us into different breakout rooms so we can discuss the prompts in smaller groups.

Today's prompts:

1. If you could take a trip anywhere, where would you go, and who would you take?

2. How can we learn and teach about places we've never been to and people we've never met?

3. What from your breakout room do you most want to share with the large group? Create a summary statement together, and select a participant to share it.

Of course, these are just starter topics. You are welcomed to have other conversations. I will come and go from each room and bring us back together into one large group 10 minutes before our hour-long session ends. We will share our summary statements before saying goodbye.

**

Welcome back to the large group. Let's take a moment to share our groups' statements. Who would like to get us started? (Facilitator links and frames statements)

**

Thank you so much for joining us! This is a highlight of my week, and I look forward to seeing you again next week. As always, please send questions and ideas you would like for us to consider in future weeks. Please also feel free to share the link with your colleagues. Ma'a Salama!

RESULTS

Twenty to fifty people participated each week. Roughly half were teacher candidates from MSU, and half were international teacher trainers, educators, and NGO workers from countries such as Morocco, Egypt, the United Arab Emirates, and Jordan. Thirty-one teacher candidates out of eighty-two who were enrolled in the course sections attended at least three chats and submitted a reflection paper to fulfill an assignment option. Several teacher candidates and educators attended all sessions even though this was an optional activity, and attending additional chats was not attached to assignment options. Some MSU colleagues and former students who learned of the chats by word of mouth also asked to join sessions.

Overwhelmingly, teacher candidates report appreciation for the mentorship they received from veteran teachers. For example, they wrote of how Faukia from Egypt reassured them that "You need to love your students and love what you're doing, and you will do it well." While Marwa advised them to "Learn about people, not governments." Students experiencing stressful situations at home report that the chats have become "a light in dark times". They describe finding comfort and "beauty" in seeing classmates develop cultural literacies that will support their future students' learning.

Additionally, they link the benefits of this activity directly with our historically notable times-- "Thanks to these World Ed Chats, I have made connections all over. I have also had something to look forward to in what has been an uncertain time. I never thought quarantine would take me all over the world. We are all different, but more alike than you would think. To feel even more connected to the world and people during a time like this has been a blessing."

IMPLICATIONS

Elementary social studies standards have long been built around a limiting framework of "expanding horizons" or "expanding environments" (Brophy & Alleman, 2006; LeRiche, 1987; Zarillo, 2000). This begins with a focus on the individual that gradually expands outward to include the classroom, community, and beyond. However, in many of our Midwestern teaching and learning contexts, you can expand horizons "until the cows come home" and rarely encounter experiences and relationships that lead to the development of cultural literacies and global understanding. Media further amplifies the toxic narratives of the "diversity deserts" in which some teacher candidates were raised (McCafferty-Wright, 2016). The consequences unfold within and beyond our classrooms.

During our weeks of World Ed Chats, on the first day of the religious holiday of Ramadan, an arsonist destroyed a mosque in Missouri (Vera & Alonso, 2020). This was but the latest of several mosque and Islamic center attacks that have occurred over the past couple of decades in Missouri. The domestic terrorists who committed these acts had dozens of educators, each with opportunities to actively disrupt dangerous narratives in their classrooms. This situates expanding the global horizons of teacher candidates within anti-terrorist and anti-racist work (McCafferty-Wright, 2016).

Towards the ends of disrupting dangerous narratives and teaching for a more just world, we highlight the following early implications of using World Ed Chats with teacher candidates:

1. We must recognize that although participating in a shared activity, we enter with different identities and goals (Brown & Hewstone, 2005; Hewstone & Brown, 1986). As indicated by attendance, teacher candidates from MSU and international participants found value in the chats. However, they benefitted from the chats in different ways. For example, our Arabic speaking participants valued having the opportunity to use conversational English with native speakers while our teacher candidates valued the opportunity to learn about education systems in other countries.

2. We can leverage all components of the activity for building cultural literacies and reducing bias. For example, through the scheduling and operating of the chats, teacher candidates learned to be mindful of Ramadan fasting and prayer schedules; the facilitator often incorporated Arabic into greetings, announcements, and side conversations to disrupt the hegemony of English; and upon the birth announcement of a participant's son, students learned about the special meaning of his Arabic name and that it's appropriate to congratulation the family with a hearty "Mabrouk!". As "an interrelated bundle" of experiences, the components of these weekly interactions work to reduce prejudice and improve intergroup relations (Birtel, Vezzali, & Stathi, 2018; Pettigrew & Tropp, 2006).

3. We must commit to collaborative design with teacher candidates and international participants if we wish to engage in justice-oriented work (Bang & Vossoughi, 2016; Gutiérrez & Jurow, 2016). Although the instructor initiated the chats, all participants were encouraged to send discussion topics and questions, make announcements, recruit colleagues to participate, advise for schedule changes during Ramadan, etc. Additionally, participants actively shaped the weekly format that emerged. For example, after a teacher candidate shared a children's book about Ramadan, sharing books became a repeated feature of our announcements.

FUTURE RESEARCH

World Ed Chats have become an essential component of this course, whether offered in a traditional format or online. Although the activity evolved from an instructor's rapid pandemic lesson planning, over time it incorporated new elements shaped by participants. Moving forward, teacher training centers in Morocco have expressed an interest in coordinating chats, colloquia, and parallel course components for Moroccan and MSU teacher candidates. Over the coming months, we will transition to a participatory action research model as we begin partnering with Moroccan colleagues to build a shared program.

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Through the Constructivist Lens:
A Vision for Preparing Pre-Service Teachers for Online Teaching

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The COVID-19 pandemic changed face-to-face teaching in most K-16 classrooms, and many teachers had to quickly transition to online teaching with little guidance or resources. In response to this, educator preparation programs (EPPs) need to give pre-service teachers (PSTs) meaningful online educational experiences to become better prepared to teach online. In this chapter, the authors will share how they implemented a constructivist framework to create a collaborative problem-solving opportunity in an online learning management system where the PSTs became active participants in the learning process. The authors discovered that providing PSTs with opportunities to develop and deliver instructional content through a digital platform helped them to learn about the benefits and challenges of online education and continued their development as future educators.

INTRODUCTION

Based on constructivist theory, people construct their own understanding and knowledge of the world through experiences, and that meaning is influenced by the interaction of prior knowledge and new events (Arends, 1998). The COVID-19 pandemic changed face-to-face teaching in most K-16 classrooms, and many teachers had to quickly transition to online teaching with little guidance or resources. In response to this, the authors discovered that educator preparation programs (EPPs) need to find purposeful ways to instruct pre-service teachers (PSTs) through technology and to give them opportunities to deliver content through a digital platform because it is pivotal that future educators develop the necessary knowledge and skills in online education (Fahrman et al., 2020) to be prepared to teach online (Cooper et al., 2020). This is best accomplished by providing PSTs with authentic opportunities to experiment with online teaching experiences (Jang & Chen, 2010). EPPs need to implement a constructivist framework by creating collaborative problem-solving opportunities in an online learning management system (LMS) where PSTs can become active participants in the learning process as they strive to develop the skill set necessary to become effective online educators.

INNOVATION

Learning, according to constructivism, involves paying attention to relevant information, organizing that information into coherent representations, and integrating those representations with existing knowledge (Landis, 2008), and these pedagogical goals can be applied within the context of online education. Constructivist learning environments can be provided through an LMS, as they allow for knowledge and authority to be shared between teacher educators (TEs) and PSTs, the TEs can take on the role of facilitator, and small PST learning groups can collaborate toward a common goal (Tam, 2000).

The authors co-teach a secondary education instructional methods course, which not only allows for each TE to support different subject areas but also demonstrates the co-teaching model in the classroom. Traditionally, the undergraduate course is a junior-level, face-to-face class that focuses on effective instructional strategies. Based on the COVID-19 pandemic and the sudden transition to online teaching in K-16 education, the authors immediately saw an opportunity

for PSTs to practice delivering instructional content in an online environment and to construct meaning through active engagement in a real-world assignment. In order to develop the PSTs' technological understanding and problem-solving skills within online education, an assignment was modified to connect the previous face-to-face course learning objectives to the current online platform.

Students (N = 12) in the course were asked to work in pairs to develop and deliver an online professional development (PD) learning session through the University's LMS known as the Electronic Communication Network (ECN). The PD sessions were asynchronous to allow for flexibility in completing the assignment due to the PSTs' scheduling conflicts during the pandemic. Each PD session was based on a topic that related to supporting students in the classroom beyond the course curriculum, such as addressing bullying or supporting student-athletes. Since the PSTs had never been tasked with creating and delivering online content, the authors needed to provide scaffolding and guidance. Detailed guidelines of the PD requirements and structure (see Appendix A) were shared through ECN. The PSTs used the guidelines to develop, deliver, and monitor their PD sessions. Each PST pair selected a topic and created a shared folder in ECN to store the files for their PD session. Over the course of two weeks, the PST pairs digitally collaborated to develop an interactive PowerPoint presentation that included key information and embedded videos related to their PD topic and to create an informational handout that highlighted the main terms and concepts provided in their presentation. Each PST pair developed discussion questions on their topic to generate a strong online dialogue among their classmates, and they created an online discussion forum in ECN. The last step was to create an online quiz, choosing between an application they were familiar with (Google Forms) or a new application (SurveyMonkey) for more of a challenge.

Once all PD sessions were fully developed, the PSTs participated in each session by reviewing the PowerPoint presentation, reading the handout, participating in the online discussion, and taking the online quiz. Each PST pair monitored the progress of their classmates in their PD session by answering questions and addressing any issues posted in ECN Messages, moderating their online discussion in ECN Discussion Forums, and collecting and analyzing the scores for their online quiz. The authors also participated in each PD session to provide detailed feedback on the successes and areas for improvement, and they used a teacher-created rubric to assess the PD sessions (see Appendix B).

RESULTS

Through the PSTs' feedback on the benefits and challenges of their online teaching experience (see Table 1), the authors learned that the PSTs felt that it took time and effort to adjust to working online to create and deliver effective instructional materials and that collaborating digitally can be difficult; however beyond these challenges, the PSTs believed that the experience was beneficial for their development as future educators. The authors found a correlation with their own reflections (see Table 2), as they also believed that the experience gave them an opportunity to learn how to develop and facilitate online assignments and a better understanding of the effort needed to do this effectively. This "quick fix" from a traditional face-to-face PD presentation to an online learning session gave the PSTs an opportunity to develop and deliver instructional content to gain valuable experience toward becoming more effective online educators. The pandemic pushed the authors to transition their course to fully online and in the process of making the necessary modifications, it was discovered that important changes need to be made in teacher education.

Table 1

Spring 2020 Pre-Service Teacher (PST) Feedback on Online PD Session Assignment

PST	Q1: What did you find beneficial from completing the PD session assignment?	Q2: What did you find challenging when completing the PD session assignment?
A	I found it beneficial looking at ways to help students outside of just the classroom.	What I found challenging was finding a topic that would truly help my students.
B	I found that working together through in an online assignment is very important. We can see that based on everything that's happening in the world, we will need to know how to communicate and work together online.	The hardest part was doing this through technology. Obliviously it is easier if we worked together on it in person in class, but it took a little bit of getting used too at first.
C	I thought that it was beneficial that we got to research and discuss a real issue in schools and to share it online in an innovative way.	I thought it was a challenge on what exactly to talk about and how in depth to go with the topic chosen to make sure we covered the topic well.

PST	Q1: What did you find beneficial from completing the PD session assignment?	Q2: What did you find challenging when completing the PD session assignment?
D	While thinking about all of the non-academic barriers that my future students will face seemed quite alarming, it also reminded me that education is so much more that lesson planning and assessments.	One of the challenging components of the PD sessions was finding reliable resources that suggest how teachers should handle such serious issues.
E	I thought the PD session were very informational and I learned a lot about the topics addressed. I thought it was also helpful to use the tools we used in an online format to develop digital skills.	Although learning how to teach something online was helpful it was also a challenge. I also found it harder to work with my partner on things than normal because of the online situation.
F	I enjoyed this project because it let the pre-service teachers look into the future of different problems and situations they will have to deal with in the future of teaching.	I found the discussion posts the hardest because a lot of them put the teacher into a position that I have never thought about before.
G	I think it did give me some good insight to teaching remotely. My partner and I worked well together and we both saw how difficult it is to move an entire class online. It was a little overwhelming at first.	I wish we would have had some online meetings, like Zoom, maybe once a week to make sure there wasn't any issues and to talk about things. I think that would really help in the future as it also keeps us accountable.
H	I prefer online instruction to in-person instruction. I think this activity was interesting in learning how to create content for online use.	The greatest challenge was learning how to create the online quiz.

Table 2

Spring 2020 Teacher Educator (TE) Reflections on Online PD Session Assignment

TE	Q1: What did you find beneficial from developing and delivering the PD session assignment?	Q2: What did you find challenging when developing and delivering the PD session assignment?
A	Learned how to provide detailed and organized guidelines that could replace the verbal directions given in class	Establishing and reinforcing clear expectations and deadlines and encouraging the PSTs to reach out with questions to provide the support and guidance normally given during face-to-face meetings
	Allowed me to process how to construct an online learning module within the PSTs' accessibility/privileges in ECN	
	Provided PSTs with practice in delivering content online that would build an important skill set in K-12 education	Motivating PSTs to use time management skills to work on the assignment in a timely manner
	Gave me and PSTs a brief glimpse into the effort and resources needed to develop and deliver an effective online session	Determining an effective way for PSTs to provide peer feedback on the PD sessions that would help improve their skills moving forward
B	Using ECN provided real-world application in developing online assignments	Needed to learn technology (ECN) better to create and demonstrate for pre-service teachers (PSTs) to use
	Incorporated new way of teaching a face-to-face course through online learning	Assignment needed to be clear and concise for PSTs to understand. Also, we needed to include resources for students to use in deciding topics
	Allowed teacher educators to work together in developing the online assignment using our strengths	
	The online format made grading the assignment easier for teacher educators	PD topics were submitted online later than when due in a face-to-face classroom

IMPLICATIONS

In face-to-face courses, opportunities to provide "real-life" digital experiences for PSTs are limited (Kim & Baylor, 2008). EPPs should implement a constructivist approach to provide PSTs with opportunities to develop and deliver online content that would embed learning in a realistic context, encourage PSTs to take ownership of the learning process, and promote the use of multiple modes of representation in a digital format (Honebein, 1996).

Constructivism states that learners construct meaning through active engagement in authentic problem-solving opportunities, and it is important for learners to see meaningful connections between what they are learning and the real world (Landis, 2008). Allowing the PSTs to use ECN gave them practice in using online learning tools that can also be found in LMSs used in K-12 education. Implementing a constructivist approach through technology can help PSTs deepen and expand their knowledge and skills in online teaching through experimenting with peers. EPPs need to create collaborative problem-solving environments where PSTs become active participants in the learning process and are given an opportunity to directly impact the learning of others.

Teacher educators need to understand the connection between technology, pedagogy, and instructional content, so they can offer online learning experiences that build and expand on all three areas. Additionally, TEs need to think creatively about ways to transition face-to-face assignments to multifaceted online projects to meet the course objectives and the changing needs of the PSTs. These projects must include clear and detailed guidelines and a rubric that outlines the expectations, so PSTs can take ownership of the projects and increase their self-efficacy toward becoming more proficient in online teaching.

In constructivism, learners build new knowledge upon the foundation of previous learning, and prior knowledge influences what new or modified knowledge a PST will construct from new learning experiences (Phillips, 1995). In order to prepare PSTs for their future classrooms, EPPs need to thread technology-enhanced teaching and learning opportunities throughout their programs to extend and broaden PSTs' knowledge and skills in online education. PSTs should also be given multiple opportunities to practice developing and delivering online content in both synchronous and asynchronous formats, so they can continue to build on prior knowledge and skills as they prepare to offer their own digital learning experiences to their students.

FUTURE RESEARCH

The future of K-16 education is not clear, but the authors believe that online education will continue to expand as an integral part of the learning process. EPPs must offer multiple opportunities for online teaching to occur, and future research needs to be conducted to further examine the impact of these educational experiences on PST development. Applying the constructivist theory and the framework discussed in this chapter, EPPs can conduct future research on ways to motivate PSTs to create meaningful learning experiences in an online environment (Kim & Baylor, 2008). Research should further evaluate when and how often PSTs should be provided with online teaching and learning opportunities and how these factors impact the development of skills and knowledge in online teaching. Future research should also examine the impact of developing content for and delivering to an authentic audience of K-12 students and how feedback can be used to further impact the PSTs' professional development. This evolving perspective on the value of online educational experiences will change how EPPs prepare and empower PSTs moving forward.

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APPENDIX A

Online PD Learning Session Guidelines

Pre-Service Teachers, as we reflect on the impact the current global health crisis is having on education, you immediately see that in-service teachers are having to find effective ways to teach online. As we think about ways to help you prepare as future educators, we believe it is important for you to have an opportunity to deliver content/instruction in a digital environment. The professional development (PD) session assignment is a perfect opportunity for this!

Select Your PD Topic:

Please use the link to the Excel spreadsheet provided in the **Professional Development Sessions** folder to **indicate your teacher partners and your selected PD topic**.

In the **Professional Development Sessions** folder, we will create a **subfolder for each group's PD session topic**. You will be responsible for maintaining the contents of your PD session folder.

Create Your Professional Development Session:

PowerPoint Presentation

- Create a **PowerPoint presentation** that each of your classmates can review to become familiar with your topic. There is no minimum number of slides, but you will want your presentation to be professional and thorough enough to provide important information to your classmates. Add links to videos and documents and insert graphics or charts/graphs that help define, explain, and clarify your topic. Be thorough but concise in your presentation and read through for grammar and punctuation errors. Make sure your PowerPoint is easy to follow, as your audience will be working through the slides on their own. **As a minimum requirement, please include the following in your presentation:**
    - Title slide with teachers' names and PD topic
    - Explanation/definition of the topic/issue you are addressing in your session
    - How it applies to education - include statistics, facts, etc. that support your information
    - Strategies to support the middle school or high school students in your future classrooms (based on the topic)
    - Resources teachers can reference
    - Reference slide that lists your sources
- After your PowerPoint presentation is completed, please name the file - ***[PD Topic] Presentation.PPT*** (for example, *Substance Abuse Presentation.PPT*).
- Place the PPT file in your PD session folder in ECN Resources.

Informational Handout

- Create an **organized handout** that outlines the **key terms and concepts** from your PowerPoint presentation.
- Name the file - ***[PD Topic] Informational Handout*** (for example, *Substance Abuse Informational Handout*).
- Place the completed handout in your PD session folder in ECN Resources.

Online Discussion

- **Develop 2 – 3 discussion questions about your topic**. Think of open-ended questions that will generate a productive online discussion among your classmates.
- Using **ECN Discussion Forums**, create a new Discussion Topic and post your questions to the class.
- Create a Discussion Topic title - ***[PD Topic] Discussion*** (for example, *Substance Abuse Discussion*)
- Require your classmates to **reply to at least one other person's posting**.
- Moderate the discussion by posting replies as your classmates respond to your questions.

Online Quiz
- Using **Google Forms** or **SurveyMonkey**, create a **5-question quiz** on your topic. Each question should be worth 1 point. Reflect on the question types discussed in class.
- Create a title for your PD quiz - ***[PD Topic] Quiz*** (for example, *Substance Abuse Quiz*).
- Post the link to your quiz in your PD session folder in ECN Resources.
- Once your collect all scores for your online quiz, complete the **Quiz Analysis Assignment** and send the scores to the course instructors.

Assignment Assessment
Please reference the assignment rubric for specific grading requirements.
<u>**Work Timeframes:**</u>
Two Weeks
- **With Teacher Partner** - Create your Professional Development Session, including the PowerPoint presentation, informational handout, discussion posting, and PD quiz. If you have any questions about the assignment, please email the course instructors.

One Week
- **Individually** - Participate in <u>**each**</u> PD session (5 total) by reviewing the PPTs, reading the handouts, participating in the discussion forums, and completing the quizzes. If you have any questions about the PD sessions or experience any issues, please use ECN Messages to contact the PD teachers
- **With Teacher Partner** – Monitor your PD session by checking for ECN Messages that relate to your session, replying to discussion postings in your ECN Discussion Forum, and collecting scores for your PD quiz

Online PD Learning Session Rubric

PD Topic:

Teacher Partners:

Assignment Element Assessed	3 Target	2 Acceptable	1 Unacceptable	Points
PowerPoint Presentation				
Explanation and Connection to Education	Thoroughly explained and defined the topic and effectively connected it to education	Adequately explained and defined the topic and connected it to education	Did not adequately explain the topic OR no connection to education was provided	
Multiple Modes of Representation	Included video, images, and charts/graphs to explain PD topic	Did not include 1 of the following: video, images, and charts/graphs to explain PD topic	Omitted 2 or more of the following: video, images, OR charts/graphs to explain PD topic	
Support Strategies	Included strong strategies to support students. Specific details and examples were provided	Included limited strategies to support students. Additional details OR examples are needed	Did not included strategies to support students OR did not provide any details or examples	
Organization and Writing Conventions	Well-organized and easy to follow. There were few errors	Somewhat organized and challenging to follow. There were several errors	Disorganized and hard to follow. There were many errors	
Reference Slide and Resources	Included a refence slide along with 3 - 5 strong resources for reference	Included a reference slide along with 3 OR less resources for reference	Did not include a reference slide AND/OR few resources were included for reference	
Informational Handout				
Key Terms and Concepts	Included key terms and concepts from the PD PowerPoint	Included some key terms and concepts from PD PowerPoint	Included some key terms OR concepts from PD PowerPoint	
Layout and Writing Conventions	Well-organized and easy to follow. There were few grammatical errors	Somewhat organized and a little difficult to follow. There were several errors	Not well organized and difficult to follow. There were many errors	
Submission Requirements	Correctly named and posted in the PD folder by the due date	Incorrectly named OR posted after the due date	Incorrectly named AND posted after the due date	
Online Discussion				
Discussion Questions	2 – 3 discussion questions were created that promoted a strong online discussion	2 – 3 discussion questions were created that promoted a moderate online discussion	1 - 2 discussion questions were created that promoted online discussion	
Discussion Forum	Created a Discussion Forum in ECN and posted the questions to the class	Created a Discussion Forum in ECN but omitted questions	No Discussion Forum in ECN was created	
Moderation	Effectively moderated the online class discussion	Adequately moderated the online class discussion	No moderation for the online class discussion	
Online Quiz				
Quiz Questions	Included 5 well-written questions to assess PD session knowledge	Included 3 – 4 questions to adequately assess PD session knowledge	Included 1 - 3 questions to assess PD session knowledge	
Google Forms or SurveyMonkey	Created a functional online quiz using Google Forms OR SurveyMonkey	Created a somewhat functional quiz using Google Forms OR SurveyMonkey	No online quiz created	
Quiz Scores	Collected and sent classmate scores to course instructors	Collected scores but omitted sending the score to instructors	No scores were collected	
			TOTAL POINTS	/42

Practical, Proactive and Responsive Teacher Preparation for the Virtual Context

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This chapter describes the pragmatic actions and processes taken both proactively and reactively by one Educator Preparation Program (EPP) associated with the professional development of preservice teachers relative to instruction in both blended and online learning environments. Actions taken include programmatic curricular changes and collaborative partnerships with virtual learning school partners. Completion rate for Clinicals or student teaching was one hundred percent due to quick response and actions designed for success in the online classroom. Teacher preparation must include design and execution of instruction in online learning to address student learning needs and ensure classes continue without interruption.

INTRODUCTION

Understanding the complexity of change, particularly unexpected and unprecedented global crisis, teacher preparation must reflect an integration of knowledge about the learner, the context, the discipline and emerging technologies in an applied manner. Though research supports intentional integration of technology through modeling and experience (Mishra & Koehler, 2006), inadequate teacher preparation persists as researchers report hesitancy and uncertainty regarding technology (Kovalik, Kuo, & Karpinski, 2013; Poyo, 2016; Buss, R., Foulger, T.S., Wetzel, K. & Lindsay, L., 2018). Specifically, inadequate preparation for instruction in online learning environments (Barbour, M. K., Siko, J., Gross, E. & Waddell, K., 2013) gained widespread notoriety as educators were forced to move instruction online amid the pandemic COVID-19, engaging in emergency remote learning (Trust, 2020; Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A., 2020). The above is influenced by professors providing the practical applied knowledge and skills during the educator preparation program.

Incorporation of the Technological Pedagogical and Content Knowledge (TPACK) model provided the foundation for designing experiences with technology (Mishra & Koehler, 2006) for classroom spaces in which the 21st century student learns. In this model, technology integration is influenced by knowledge bases. These knowledge bases are developed and formed in the teacher candidate through the EPP's use of modeling, instructional design and experiential learning within the curriculum. The key is to provide real experiences through partnerships, so the students are well prepared for any situation as a teacher. Technology-based courses and courses developed in the TPACK framework offer teacher candidates practice with the possibility of transferring these skills as they integrate technology in the classroom (Niess & Gillow-Wiles, 2012).

INNOVATION

Administrators took an innovative programmatic approach to both instruction of teacher candidates as well as development of school partners given the increase of K-12 students participating in virtual learning and ultimately school closures during the COVID 19 pandemic. First, this EPP responded proactively in 2016, sharing in the responsibility

to train educators for all models of education, including online instruction (Kennedy, K., & Archambault, L., 2012) by creating and piloting the course Preparing Educators for Virtual Contexts as an elective available to Education majors. This course, aligned with International Society for Technology in Education (ISTE), International Association for K-12 Online Learning (iNACOL) Ohio and Council for the Accreditation of Educator Preparation (CAEP) standards, included content and pedagogical knowledge of virtual learners, tools for online and blended learning, principles of multimedia learning theory and application of the TPACK knowledge bases. Viewing the educator as a designer of innovative content, teacher candidates enrolled in this course are immersed in modeled instruction while gaining experience in instructional design by creating and executing learning within virtual contexts. The syllabus for the pilot course (EDU 438 Preparing Educators for Virtual Contexts) and the syllabus for the regularized course (EDU 366 Preparing Educators for Virtual Contexts) are available online at: https://wke.lt/w/s/jqUVMF.

In addition to curricular changes, faculty also spent time cultivating relationships with local virtual school partners. A needs assessment was performed as faculty met with site level administrators at virtual schools to identify and evaluate gaps to be addressed through this partnership. Some factors included: a) engagement of students, b) mentoring by teachers, c) full-suite learning management systems, d) viable curriculum, and e) willingness to allow teacher candidate engagement in the system. Teacher candidates were paired with in-service teachers as mentors for modeling and required to engage in instructional design as well as execution of learning activities within this context. Creating partnerships with local virtual K-12 schools allowed students practice with both synchronous and asynchronous instruction, positively affecting attitudes, knowledge and skills toward online instruction (Barbour, M. K., Siko, J., Gross, E. & Waddell, K., 2013; Poyo, 2018).

Additional steps were made to ensure field and clinical experiences for teacher candidates included the virtual learning environment. University administration secured a partnership with the local Education Service Center (ESC). The University's desire to provide more clinical training and learning experiences and ESC's desire to permit the same resulted in welcoming our students as part of the educational experience for their K-12 students. The document showing the responsibility of each entity (available online at: https://wke.lt/w/s/jqUVMF) may be used as a guide for peer institutions. This practical and proactive measure allowed a speedy response to the state governor's declaration that all K-12 schools be closed in March of 2020. Educator Preparation Programs (EPP)'s across the country struggled to provide an alternative plan for completing state required clinical field hours for teacher candidates, but relationships built prior to the crisis were strong enough to move forward to ensure teacher candidates were not left behind. Administration and faculty from the EPP and ESC engaged in conversation immediately, creating a contingency plan for placing teacher candidates in the virtual context with both a cooperating teacher and supervisor. The new environment was completely online; students trained along with the university coordinators who made the transition seamless, providing alternative clinical and field placements for our students to remain in compliance with state requirements for licensure.

RESULTS

Evaluation of the program utilizing data from course completers, course evaluations and dialogue with local partners led to modifications. Curriculum changes within the program are reflected by iterations of the course information sheet (available online at: https://wke.lt/w/s/jqUVMF) demonstrating responsiveness to both changes in local partnerships and changes in pedagogical strategies. Given the governor's state of emergency declaration, our clinical students (e.g., student teachers) still needed to complete five weeks of their 14-week placements. Additionally, our early experience students (e.g., field 1 and field 2) completed 36 of the 60 hours required, leaving 24 cumulative hours to complete their requirement. Under the supervision and modeling of in-service educators, teacher candidates planned and designed learning activities for virtual contexts Clinical students (n=29) completed over 2,621 hours in the online classroom with 100% completion and early experience students (n=86) completed over 1484 hours in the online classroom with 91.9% completion.

IMPLICATIONS

EPP's should take a programmatic approach to the integration of technology with emphasis on gaining purposeful and novel practice within both content and methods courses. Create intentional modeling, instructional design and expe-

riential learning opportunities within and among the curriculum of your EPP. Suggestions include designing a program wide and program deep infusion of technology in the curriculum (Wetzel, K., Buss, R., Foulger, T. S., & Lindsey, L., 2014) to create reflective, iterative and relevant learning for teacher candidates. Create partnerships with local and global online schools, providing opportunities for students to gain a variety of experiences, including the use of online tools for instruction. Develop perceptions of quality online instruction and how it differs from emergency remote teaching.

Finally, although a global crisis such as COVID-19 brought unprecedented challenges and unrest, we live in an era of great technological advancement, particularly in what is available for serving students in various learning environments. It is clear we need to demand EPPs include preparation for design and execution of online instruction. We move forward, learn from our history and utilize these resources to make instruction in any learning environment exceptional. Students familiar with online learning required the least supervision or motivation to complete their hours. Teacher candidates completing their student teaching may have been motivated by proximity to graduation and desire to obtain credentials for employment in PK-12 schools fall 2020. We cultivated relationships with virtual school partners and through the ESC by providing educational opportunities for both the partner staff and the EPP students.

Consistent and frequent communication of positive aspects of the change to emergency online learning served as a support for teacher candidates' attitudes and skills toward online instruction. Success of our clinical students may be in part due to their supervisor's frequent feedback, particularly assisting a shift in perspective, highlighting how new experiences would benefit them professionally and how immediate assistance would support their new online students' learning.

Table 1
Process for Practical, Proactive and Responsive Teacher Preparation

Step	Action	Potential Resource or More Information
1a	Identify potential partners for collaboration within the K-12 environment.	a) Educational Service Agencies are in every state and mostly amenable to partnering as part of their mission. b) Contact State Department of Education to identify online and blended schools in your local area.
1b	Plan and implement a curriculum that immerses teacher candidates in online and blended learning environments.	See Appendices A and B
2	Conduct a needs assessment with the potential partner school(s).	See Innovation, paragraph 2.
3	Determine if the partner is a good fit for your institution and create a partnership agreement if so.	See Appendix C
4	Evaluate the program by using data on program completion of students, course evaluations and qualitative feedback from program completers.	See Appendix D and Future Research
5	Repeat cycle at least triennially.	Repeat, determine necessary changes and implement changes every three years.

FUTURE RESEARCH

Improvement of this research includes examining program completers' perceptions of preparedness for instructional design and student engagement in online learning contexts. Questions for future focus groups are found in the Appendix. The qualitative approach will be used to determine effects of the programmatic changes made to ensure the teacher candidates were prepared for any instructional environment, whether online, blended or on-ground. The authors of this chapter will conduct the qualitative study over the next 6 months and deliver outcomes in a future article as appropriate. The

authors of the chapter also encourage others to use the Appendices to replicate the TPACK model within their program curriculum and establish partnerships ensuring practical, proactive and responsive teacher preparation for the virtual context.

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APPENDIX A, B, AND C MAY BE FOUND AT THIS SITE

https://wke.lt/w/s/jqUVMF

APPENDIX

Questions for Focus Group

Demographics

1. Where do you teach?

2. What grade level do you teach?

3. How long have you been teaching?

4. Did you take the course Preparing Educators for Virtual Contexts?

Effects of Curriculum Changes in EPP

1. How important was it for you to have the practical experience of online instruction within a virtual environment during the course Preparing Educators for Virtual Contexts?

2. What specific tools, content knowledge or pedagogical knowledge have you used from this course?

3. Do you think your attitude or perception towards online instruction and learning changed after taking this course? If so, how? If not, why?

Using a Critical Perspective to Transition an Elementary Mathematics Methods Course to a Virtual Learning Experience

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Elementary mathematics methods courses are responsible for ensuring preservice teachers have the content, pedagogy, and dispositions in order to teach mathematics effectively. Two elementary mathematics teacher educators (MTEs) present the transition of an elementary mathematics methods courses to an on-line learning experience due to the COVID-19 pandemic. The MTEs used a critical perspective framework to ground their transition. Ultimately, the MTEs were modeling a student-centered approach that positioned them as facilitators with shared authority with their students. Anecdotal results and recommendations are presented.

Keywords: elementary mathematics teacher education, elementary math methods, preservice teacher, COVID-19, mathematics teacher educators, virtual teaching

INTRODUCTION

Elementary mathematics methods courses are designed around three areas: content, pedagogy, and dispositions (Association of Mathematics Teacher Educators [AMTE], 2017). Elementary teachers need a strong mathematics content background, coupled with instructional practices to meet student needs (AMTE, 2017; National Council of Teachers of Mathematics [NCTM], 2014; Spangler & Wanko, 2017). In addition, elementary teachers need a disposition with a perspective to recognize and break down barriers and systemic practices that hinder student learning (Gutierrez, 2013; Martin, 2015; Tate & Ladson-Billings, 1995). These expectations for elementary mathematics teachers are addressed in methods courses. Typically, methods courses are designed to match mathematics teaching and learning found in elementary schools, in a face-to-face, hands-on, interactive format. This format is conducive to modeling lessons and activities with concrete materials, building a classroom community, and developing productive discourse regarding the teaching and learning of diverse children.

When the pandemic hit, one thing was clearly evident. This course was not just moving to an on-line learning environment but was creating a virtual version of a face-to-face course. The pandemic was changing everything for both students and faculty. The needs of learners had to be at the forefront of the design and implementation, so looking at the course with a critical perspective was essential. Drawing on core propositions (expectations) for mathematics teacher educators (MTEs; Willey & Livers, 2018; see Table1), we used this time to revisit our conceptualization for teaching a methods course to ensure key schematics of the course were maintained. Considerations needed to include the student perspective, life and academic situations, and the desire to deliver quality, and rigorous instruction.

Table 1

MTE Critical Perspective Propositions

Propositions

1	Committed to preparing and supporting high quality mathematics preservice teachers and their practices.
2	Know mathematics and pedagogy, and understand how these are represented in classrooms and beyond matters significantly in how children affiliate with mathematics.
3	Responsible for managing and monitoring preservice teachers learning and dispositions.
4	Think systematically about their practice and how it represents or disrupts dominant or harmful ideologies about mathematics teaching and learning.
5	Resourceful, continually seeking and sharing new knowledge from and with learning communities.

Willey & Livers, 2018

INNOVATION

Two mathematics teacher educators (MTEs) at Missouri State University, both with16 years' experience teaching mathematics methods in a face-to-face format, were tasked with the transitioning of elementary mathematics methods course to an on-line offering. Propositions 1 and 5 from Table 1 drove the transition, as we were committed to maintaining a quality learning experience, we began locating resources, collaborating, and reaching out to colleagues.

We knew it was possible to maintain a community of learners within an on-line format through careful use of discussion boards (Sliva, 2002). On-line discussions allow for students to process, reflect, and get feedback from peers and the MTEs (McDuffie & Slavit, 2002). We also knew that teaching videos would be essential to display best practices in mathematics teaching since students wouldn't have access to schools. The key to using teaching videos is the debrief and careful identification of strong pedagogy to disrupt misconceptions regarding mathematics teaching (Kellogg & Kersaint, 2004). We would have to ensure through synchronous time, discussion boards, and on-line modules that we could provide this necessary pedogeological dialogue often found in face-to-face methods courses (Kellogg & Kersaint, 2004). Schwartz (2012) implemented the same mathematics activity in both a face-to-face methods course and an online methods course, and was able to highlight strengths with the online format that included student incorporation of a number of different types of models and strategies and an in-depth application of pedagogy. The downside of this comparison between the course offerings was the separation from peers and the lack of collaboration (Schwartz, 2012).

To begin the transition, we planned as we would for any other on-line course, guided by best practice, our schedule, and assignments (Proposition 2). What we did not initially realize was that this was going to be *crisis teaching* not normal on-line teaching. Students were navigating different spaces: job schedules, responsibilities, and access to technology. So, while we could plan a virtual learning experience, we knew deep down not all students would be able to proceed along a typical path making Proposition 4 and 3 a priority. Communication with students to assess their individual health and situations was an essential and early planning component in order to address barriers to the students learning. Likewise, we had to plan for student check-ins for the remaining of the semester in order to support students (Proposition 3). We also set both flexible deadlines and hard deadlines to accommodate the variety of work schedules and situations. Blackboard discussions regarding readings and content helped support the work of the larger formal assignments.

One of us used Padlet while the other used Google Sheets to get students and MTEs connected again for learning and identity needs and situations. Some of the questions we asked: *How's it Going? Where are you? Do you need anything? What are must dos with the course? What can we do without?* After this communication, we began tapping into other learning opportunities and prioritizing course content, thus providing a more equitable approach for our students. It became our goal to provide differentiation along multiple learning paths. Elements of our plan are found in Figure 1.

Figure 1. Key Elements of Virtual Teaching.

RESULTS

By putting our teacher candidates first, we were modeling a student-centered teaching approach, just like we had used as elementary teachers. We were in tune to their needs, situations, and wants. Students made it clear that they wanted opportunities for synchronous collaborative learning experiences. One student said, "I really hope we can have some sort of group time or live video chat. I am really struggling with this social distancing and isolations thing, I miss everyone." Additionally, students assisted in course content essentials. One student's Padlet post displayed dedication to learning best teaching practices (Figure 2) making it essential that we needed to differentiate using technology tools and resources to replace the activities and interactions of the face-to-face design. For example, analyzing teaching videos and student misconceptions, and creating activities using virtual manipulatives replaced activities that would have been done in their placements.
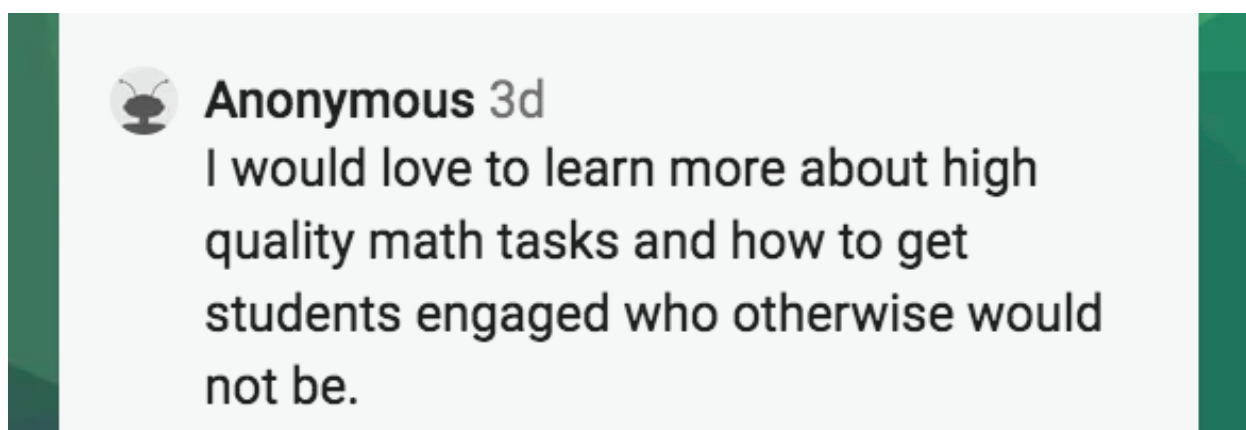
Figure 2. Mathematics Method's Student Padlet Post.

By offering choice and different learning opportunities, students were engaged in a variety of learning experiences showcasing the need and necessity for this to be done in our elementary schools. For instance, the choice activity included these choices: analyzing technology websites and apps, analyzing a lesson plan, professional development from

leading organizations (e.g., NCTMs 100 days of learning, TODOS podcasts and sessions), collaborating with a teacher to assist in teaching, or documenting mathematics teaching with children. All of the choices were chosen by at least one student. Some provided specific feedback for their choice. One student said this about her choice of assisting a teacher who happened to be her mother:

> I knew immediately I was going to choose this as my choice assignment. Since my mom has moved her fifth-grade class remotely, I've been watching and assisting her with different online platforms. Before this pandemic, my mom had never used Google Classroom, Zoom, MobyMax, and Zearn. I was able to help train her using these platforms, so she can use them to teach remotely. This has been a great experience for me as a future educator. I am confident I will be utilizing these platforms in my prospective classroom.
>
> Mathematics Methods Student, 4.24.2020

A student who chose to work with a child she nannied for was thankful for this choice and opportunity. She helped the child with the work the teacher gave and provided extra support and activities. Students who chose the professional development option were impressed to learn from a variety of experts in the field of mathematics teaching and learning and made connections to readings in the course. They enjoyed seeing the people whose work that they had read. Hands-on in-class activities were changed to students doing activities from their text using available materials or virtual manipulatives and documenting their work in a journal. This feedback from a student displayed the benefit:

> Overall, I loved this journal assignment for various reasons. To begin, this document will be there for me to reference back to when I have my own classroom. I will be able to pull up these journal entries and find the perfect activity for my class. I find it so neat and awesome how you can make these math activities fun and entertaining for children, while teaching them mathematics at the same time. Thank you for this assignment opportunity!
>
> Mathematics Methods Student, 5.3.2020

These informal, anecdotal results reveal that the instructional approach taken by the MTEs proved successful. We became clear facilitators of the learning. We were modeling what we expect teachers to do.

IMPLICATIONS

Transitioning an elementary mathematics methods course during this global pandemic was challenging. A clear driving force was to meet students' needs, not only their academic needs, but often their social emotional ones as well. It was through this focus that the course shifted to a student-centered model with differentiated tasks.

The significance of our approach and implementation was the positioning of the MTEs as facilitators within a very student-centered model with shared authority among the MTEs and preservice teachers. This positioning and shared authority proved to be positive for students. The student work that was completed during the virtual learning portion of the semester was impressive and strong. Student models and strategies were varied, diverse, and intentional (Schwartz, 2012). The synchronous time and recorded videos by the MTEs allowed the MTEs to help students focus on the pedogeological moves of the classroom videos chosen for analysis (Kellogg & Kersaint, 2004). Discussion boards allowed for collaboration, reflection, and clarification in a safe space (McDuffie & Slavit, 2002). Students who attended the optional synchronous time or scheduled office hours were prepared and had specific questions about the course content. The questions that students posed were thoughtful and related to their future teaching. Student correspondence and discussions revealed a distinct change in how they saw themselves within the course; they now felt like they were in the driving seat making sure that they were learning necessary content in order to teach mathematics effectively.

To demonstrate the specific outcomes of this transition, we have aligned them with the propositions presented in Table 1 (see Table 2). By grounding our transition in a framework for MTEs we were able to ensure that the mathematics methods course would maintain quality and rigor, but also provide the necessary components for students coping within the pandemic.

Table 2

Outcomes for Virtual Mathematics Methods Aligned with Critical Perspective Propositions

MTE Propositions	Outcomes
Committed to preparing and supporting high quality mathematics preserve teachers and their practices.	Increase in high quality mathematics options beyond textbook and MTE Committed to essential goals for the course
Know mathematics and pedagogy, and understand how these are represented in classrooms and beyond matters significantly in how children affiliate with mathematics.	Opportunity to model differentiation, shared authority, and access to virtual resources that portray classroom learning
Responsible for managing and monitoring preservice teachers learning and dispositions.	Increase in MTE and student interaction and feedback; reciprocal feedback
Think systematically about their practice and how it represents or disrupts dominant or harmful ideologies about mathematics teaching and learning.	Increase in collaboration and reflection among and between MTEs Opportunity to focus on the essentials of instruction and eliminate the noise Highlighted the difference in compliance and engagement with teaching and learning
Resourceful, continually seeking and sharing new knowledge from and with learning communities.	MTEs excelled at being resourceful, connected to professional organizations, collaboration with each other and other MTEs

As we look to planning for future semesters whether the offering is face-to-face, hybrid, or on-line, there are some clear lessons that we take from this transition. First, students need ownership in their learning, so we intend to continue to provide choices for certain assignments as well as having flexible deadlines. Second, students need both concrete and virtual manipulatives resources in order to plan for diverse learners. Third, the use and connection to leading organizations' resources and experts opened the course up to a larger field of experiences. Blogs, podcasts, and webinars proved to be added assets. Additionally, the MTEs will model their reflective practice more explicitly by monitoring and adjusting throughout the semester by connecting with students and listening to their needs.

Overall, this experience has taught us to revisit the core goals of the course and identify multiple learning paths to support students. Our recommendation for replicating or planning an online offering for methods or other courses are two-fold 1.) ground yourself in equitable practices for your field and 2.) model reflective practices. We have summarized our process into easy to follow steps (see Figure 3).
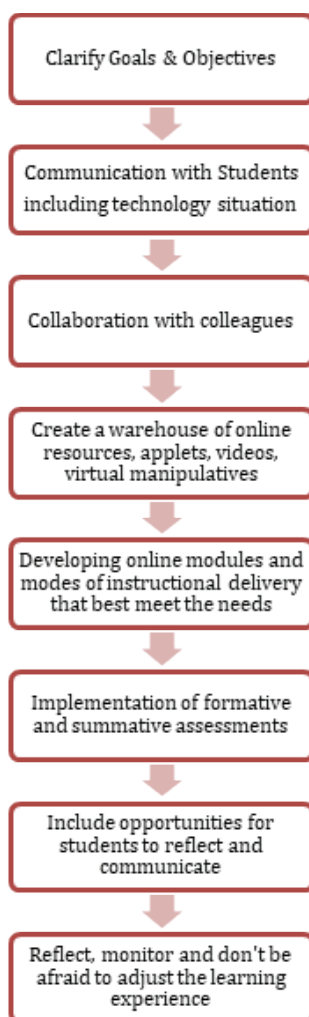
Figure 3. Steps for Replication.

FUTURE RESEARCH

As we reflect on the experience of transitioning a face-to-face methods course to an on-line learning experience, it is clear that by adhering to the core propositions set for MTEs the transition was a positive one for MTEs and for students. Given the variation in how different MTEs approached the transition, there are numerous possibilities for future research. We will highlight two of particular interest. One area of interest is to compare MTE approaches, content, and technological resources. A second area would be to follow these methods students into student teaching in order to assess the content and pedagogy that students retained during their methods course.

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Implementing Virtual Learning in Teacher Education during the COVID-19 Pandemic in a Teacher Training Center in Morocco

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The COVID-19 pandemic required teacher trainers to respond quickly by shifting to a virtual platform for ensuring continuity in the preparation of preservice teachers. In Morocco, it was imperative that the pipeline of new teachers entering the profession was not disrupted, as approximately 20,000 new teachers are needed each year. The purpose of this chapter is to share how a center for teacher training in Morocco responded to this urgent need by swiftly transitioning from in-person preparation to a fully-online learning format using an open-source, virtual learning platform, Moodle™. Center leadership and Information and Communication Technology (ICT) trainers collected data on engagement and teacher trainees' perceived strengths and barriers of this approach. Initial findings indicated high levels of use by trainers and trainees as well as advantages and opportunities for the use of virtual learning in teacher preparation. Implications for pre-service teacher educators and future research are provided.

Keywords: COVID-19, global context, open-access platform, Moodle™, preservice teacher preparation, teacher educators, virtual learning.

INTRODUCTION

Virtual learning approaches allow students to be active participants in learning by employing social constructivist pedagogy (Chavan & Pavri, 2004). Initial studies in teacher education showed students may benefit from additional time, resources, and practice opportunities (Means et al., 2009). Recently, El Hajji et al. (2016) examined blended learning in teacher preparation. Initial outcomes indicated students increased time in learning and co-construction of knowledge through social exchanges. Virtual learning can minimize barriers including distance, family-care needs, and health concerns (Patel & Patel, 2017). At no time in our history has the latter barrier been more evident. The COVID-19 pandemic necessitated a global priority of social distancing. Meanwhile, the responsibility for preparing teachers to enter the field

remained a priority. In Morocco, this was highlighted by the magnitude of new teachers (~20,000) needed each year (Chami, 2018). Moroccan education leaders moved swiftly to ensure teacher preparation continued. In this chapter, we share how one Moroccan center for teacher training responded using Moodle™, an open-access virtual platform that promotes active and collaborative learning (Costello, 2013). We also offer recommendations for teacher educators in planning for blended and online learning.

INNOVATION

At the time of COVID-19, 1,700 teacher trainees were enrolled in coursework at the Centre Régional des Métiers de l'Education et de la Formation- Souss Massa (CRMEF-SM). In general, trainers had limited experience with online coursework. While many were using online platforms (e.g., Edmodo, WhatsApp, Facebook) to maintain communications, virtual learning tools were optional. As a result, when face-to-face training became impossible, like many teacher preparation institutions, CRMEF-SM was not fully ready for institution-wide online instruction.
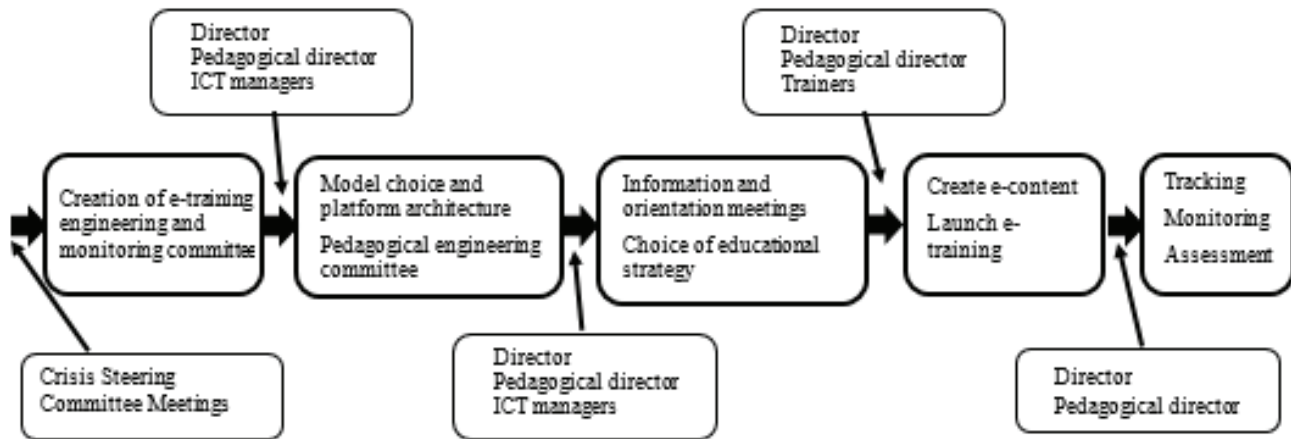
Note. CRMEF-SM = Centre Régional des Métiers de l'Education et de la Formation- Souss Massa. ICT = Information and Communication Technology.

Figure 1. CRMEF- SM process map and actors for shifting to virtual learning.

They mobilized the crisis steering committee who formed an e-Training Engineering and Monitoring committee to plan a response (see Figure 1). In the following section, we provide specific activities from development through monitoring outcomes.

First, the center's pedagogical committee and Information and Communication Technology (ICT) trainers developed an action plan for uniformity across departments. One priority was to select a virtual platform that allowed for: centralization and formalization of courses; provision of a virtual instructional space adaptive to the needs of trainees; and progress reporting at course and individual levels. Moodle™ met the three selection criteria. Another priority was to create learning spaces where trainees participate in constructing their own knowledge. Trainees' opportunities to use various resources and experience new knowledge based on collaborative learning is consistent with the emphasis of social constructivist pedagogy on group dialogue and interaction to co-construct learning (Churcher et al., 2014). Moodle provided a predictable, user-friendly platform easily accessible for asynchronous and collaborative learning (Moodle, 2020). Synchronous learning experiences were planned to mitigate feelings of isolation (Song et al, 2003).

ICT trainers initiated preparation plans for online learning. They created a Moodle space for each department with modules for trainers across five provinces. Log-in information, passwords, training materials and video tutorials were shared. Online meetings were organized using Google Meet and Zoom to offer Moodle demonstrations and to explain procedures and expectations. Additional support was provided through step-by-step guides and one-to-one virtual and phone sessions. Efforts resulted in nearly 100 online modules created and launched.

Initially, the committee determined the data to be collected to monitor engagement. For example, were all trainees and trainers actively logged-in within the first two weeks with content prepared for trainees. Additionally, trainees were surveyed about the strengths and barriers of virtual learning. The committee monitored the use of functions (e.g., assignments, forums, and messaging), and resources (e.g., videos and media, documents, workshops). Given the national importance of teacher preparation, the Ministry of Education required weekly progress reports.

RESULTS

Initial evidence suggested trainers and trainees transitioned swiftly to virtual learning, marked by high levels of engagement (see Table 1). After two weeks, all trainers and trainees ($n = 1,700$) were engaged in courses in the Moodle platform. The quick shift is underscored by training and support needed for 80% of trainers. Thirty-percent of trainers required more direct one-to-one, step-by-step support both online and through phone calls. Ten percent of trainers initially lacked available digital course content. While ICT training modules had previously been available for e-tools, there was limited motivation to develop these skills. However, the national lockdown accelerated the wide scale up of the digital transition.

Table 1
CRMEF-SM Indicators and Initial Outcomes of Engagement

Indicator	Percentage of Use $N = 1,700$
Assignments	76
Discussion forums	42
Messaging	25
Resources	62
Documents	80
Other - Wiki, poll, chat	05
Web pages	15
Workshops	20
Videos and media links	28

Note. CRMEF-SM = Centre Régional des Métiers de l'Education et de la Formation- Souss Massa.

After six-weeks, survey results identified emergent themes in the trainees' experiences on Moodle. Trainees shared the following advantages: working at their individual pace; scheduling flexibility; promoting their understanding and confidence in using online learning; increasing active and self-determined learning; and minimizing time, costs, and difficulties with educational access. Findings are consistent with previous research (El Hajji et al., 2016; Song et al., 2003).

Findings suggested Moodle courses promoted trainees' curiosity, challenge, and choice (Williams & Williams, 2011). These experiences were consistent with constructivist pedagogy (Paily, 2013). Universal Design for Learning (UDL) principles, such as multiple ways to engage and access information (e.g., videos, reading, audio; CAST, 2018), were evident in trainees' feedback regarding their motivation for learning. For example, they cited additional time to engage with content; access to multiple forms of information; and opportunities to learn deeply about special interest topics. However, trainees indicated needs for support with time-management, staying connected to others, seeking feedback, and accessing quality hardware and stable connectivity (Song et al., 2003). Despite these challenges, initial evidence suggested that online learning resulted in positive learning experiences.

IMPLICATIONS

The initial findings hold implications for teacher educators' use of virtual learning. In this section we offer specific recommendations to interested readers based on our experiences with adopting a virtual learning platform, transitioning courses online, and monitoring engagement.

First, educators should consider the needs and benefits for stakeholders (see Table 2) and consider readiness and motivation of educators and students, funding availability, and appropriateness of the virtual environment to support learning goals. Quickly enacting new tools may be limited by budgetary constraints. The use of an open-source platform offers an affordable and flexible option for teacher educators (Patel & Patel, 2017). Moodle is available in more than 100 languages. It is user-friendly and offers specific benefits (see Table 2; Moodle, 2020).

Table 2
Consideration of Needs and Benefits by Stakeholders

Stakeholder	Implication	Description
Administration		
	Cost effective	Free-access.
	Worldwide recognition	Available in multiple languages, history of successful use in global contexts; over 100 languages, 240 countries, and over 200M users.
	User-friendly interface	Configurable, highly-flexible, and feature-rich.
	Adaptability	Open source allows for ease in modification and adaptation to fit the context. Platform can be easily customized to fit program needs (e.g., dashboard, pages, menus, user access).
	Reconceptualization of ICT for education	ICT module and course content to include pedagogy for online and blended learning.
	Professional development	The acquisition of new skills for teacher trainers in the use of technologies.
Teacher trainers (teacher educators)		
	Motivation	An authentic need for developing skills in online learning and digital competence.
	Tracking trainees' progress	Formative assessment for improved monitoring of trainee learning and progress. They can extend time for trainees to complete or revise assignments. They can guide the development of knowledge and 'know-how'.
	Flexible features	Scheduling of courses, establishing discussion forums, uploading lecture notes, sharing of a wide variety of textual and audiovisual resources.
	Diverse and innovative pedagogical practices	Moving away from 'chalk and talk' and exploring new tools and educational scenarios.
	Opportunities for new roles	Facilitators, learning guides, mentors.
Teacher trainees (preservice teachers)		
	Construction of knowledge	Engage in learning that allows for the exploration of topics of interest, learn with and from others, self-regulated learning.
	Cross-cutting skills	Learn about and with virtual tools. Build confidence and skills in online learning environments.
	Flexibility	Support for offline learning that includes features for tracking, recording and assessing offline and online events. Differentiation, pacing, and meeting individual learning needs by providing multiple resources and ways to interact with learning materials.

Stakeholder	Implication	Description
Teacher trainees (preservice teachers)		
	Participation	Increased and differentiated opportunities for participation (e.g., discussion forums, chat feature, polling). Collaborative work on projects and activities.
	Self-directed	Targeted learning objectives based on specific needs and interests, pacing, scheduling, and tracking of progress.
	Time management	Allows for the monitoring and timely support for students to know and meet timelines for completion. Trainers have data on time spent on activities, reminders, and feedback.

Note. ICT = Information and Communication Technology.

Second, educators should clarify priorities for the selection and implementation of virtual learning and plan to achieve steps from exploring platforms to monitoring progress. Also, they should consider leadership and decision-making (see Figure 1). Simplicity and clarity of roles facilitate timely completion.

Third, educators should offer multiple ways to access training for new learning tools. For example, educators should consider virtual meetings, step-by-step guides, web-based tutorials, and individual meetings. They should use familiar tools (e.g., WhatsApp, G-suite, Facebook) for initial training efforts. After the initial training on the functionality of the platform, responsiveness to user needs for support should be maintained (see Figure 2).

Teacher Trainers

- Establish leadership to address technical (ICT trainers), pedagogical, and monitoring structures, guidance and support

- Provide initial training and support through familiar modes of communication (e.g., telephone, social media platforms, WhatsApp, G-suite for Education) for accessing the new virtual learning platform and managing content, resources, and tools

- Provide on-going assistance in the first two-weeks for the development of educational scenarios and implementation of modules/courses

- Provide time for collaboration between teacher trainers to share resources and tips for success

- Increase staff motivation by organizing working meetings and regular and frequent communications to present progress, compare between the different options, create a synergy between the different work teams

- Respond quickly with assistance to resolve technical problems to improve the quality of media and services provided

- Allow for flexibility in working hours and managing workload

Teacher Trainees

- Respond quickly to support solutions to technical problems in accessing the platform

- Encourage trainees to embrace the paradigm shift in their training

- Maintain frequent and regular communication to prevent dropping out and ensure attendance by promoting the institutionalization of training

- Use familiar and multiple means of communication (e.g., email, social media) to combat the delay in performing the requested tasks

- Evaluation in the form of projects with great autonomy in implementation

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Note. ICT = Information and Communication Technology.

Figure 2. Lessons learned to support stakeholders in transitioning to virtual learning.

Fourth, educators should attend to issues of motivation. Motivation is improved by learning activities that spark curiosity, and offer appropriate challenge and choice (Williams & Williams, 2011). UDL principles provide guidance for developing these types of virtual learning experiences and are available, free-access, in 11 languages (CAST, 2020).

Fifth, educators should consider virtual learning options to minimize barriers to education for those living in rural areas. This may also increase teacher recruitment, particularly in rural areas where qualified teachers are in high demand (Gallo & Beckman, 2016). Virtual learning may also expand teacher education programs' capacity to train increasingly larger numbers of teachers to meet global needs, predicted to be 25.8 million by 2030 (UNESCO, 2015).

Finally, educators need to identify data sources or indicators to determine progress milestones and success of new approaches. Sources may be organized by the course-, educator-, and student-level. Monitoring progress data frequently (e.g., daily or weekly) allows for quick responding to problems and increasing success.

FUTURE RESEARCH

In this chapter, we contribute to the understanding of virtual learning in teacher preparation from teacher trainees' perspectives (Song et al., 2003). Future studies should examine learning outcomes for preservice teachers in varied learning conditions such as in-person, virtual, and blended programs. Further research is needed in two more areas: (a) the dosage and quality of training for teacher educators to design and facilitate virtual learning opportunities, and (b) preservice teacher engagement, learning, and feedback (Mimis et al., 2019). In Morocco, the shift to virtual learning was precipitated by COVID-19; however, teacher preparation institutions need to seize this opportunity to leverage technology in improving the quality of teacher education. This study has begun to show the benefits of Moodle in promoting collaborative and inclusive learning. Future research on virtual learning will strengthen the country's evidence base in virtual education, and benefit teacher preparation. It will also contribute globally to the literature on the use of technology to secure access to education during and post disasters.

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It's a Beautiful Day in the (Digital) Neighborhood:
Using Mr. Rogers to Demonstrate Educational Psychology in Practice

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Closure of K12 schools as the result of the COVID-19 pandemic forced faculty in educator preparation programs to reconceptualize course components, especially classroom field experiences. Field experiences serve the purposes of exposing students to teaching exemplars who demonstrate educational theories in practice (Joyce-Beaulieu, 2017; Warner & Hallman, 2017). Given his approach to teaching children, Fred Rogers can serve as such an exemplar (Levin & Hines, 2003; Poole, 2018; Sharapan, 2012). The authors reflect on their experiences as an instructor and student of an educational psychology course that used "Mr. Rogers' Neighborhood" as a proxy for the typical field experience.

INTRODUCTION

The classroom field experience (FE) is a key component of many educator preparation programs (EPPs), serving two main purposes for students: 1) exposure to teaching exemplars (Hughes & McCartney, 2015; Warner & Hallman, 2017); and 2) observation of content learned within their EPP courses in practice (Allen & Wright, 2014; Joyce-Beaulieu, 2017; Rouse & Joseph, 2019). The closure of K12 schools (Education Week Staff, 2020) left EPPs with the challenge of designing learning activities that serve the same purposes of FEs. Though not a traditional teacher with a typical K12 classroom, Fred Rogers served for many decades as a teacher to generations of children. Rogers' training in child development makes him a valuable model for parents and teachers alike (Levin & Hines, 2003; Poole, 2018; Sharapan, 2012). The show's grounding in developmental psychology also provides examples of educational psychology theory used in practice. Rogers' young audience members can be viewed as students, and his "neighborhood" as a classroom, with Rogers himself serving as a teaching exemplar.

INNOVATION

The first author teaches educational psychology in a traditional EPP. A focus of the course, which included nine preservice teachers, is learning theories (e.g., Constructivism, Social Cognitive Theory, etc.). The course typically includes an extensive FE, which was canceled due to the closure of K12 schools. Given the theoretical nature of educational psychology, students often struggle to apply course content to teaching practice. The inclusion of an FE within the course helps students make this connection by evaluating teaching practice through the lens of educational psychology theory.

Instead, the author created an assignment based on the work of Fred Rogers, which fulfilled the main purposes of a traditional FE. Students first read the article, "How the Science of Learning is Catching up to Mr. Rogers" (Kamenetz, 2018), which examines the influence of Rogers' background in child development on his television show. Students were then asked to watch episodes of "Mr. Rogers' Neighborhood", available on the Fred Rogers Company and PBS websites. Students' submissions included two main components: 1) a personal reflection on the article, and 2) an analysis of the

episodes through the lenses of Constructivism and Social Cognitive Theory. The assignment prompt (see Appendix A) included questions such as, "how is 'Mr. Rogers' Neighborhood' a "constructivist classroom?" and "how is observational learning used in the show?". Evaluation criteria for the assignment (see Appendix B) were similar to planned assessments related to the classroom FE, asking students to analyze the episodes using Educational Psychology Theory. Assignments were evaluated on: 1) depth of reflection, and 2) quality of theoretical analysis.

After the assignments were evaluated, the class discussed their experience with the assignment. Discussion focused on students' personal reflections as well as theoretical analysis. An unintended benefit of this activity was consistency across students' experiences. Unlike traditional FEs, which can vary widely in context and quality, television episodes provided a common basis for discussion. This allowed students to delve deeper into theoretical analysis rather than spending time comparing contextual differences between FEs.

RESULTS

The second author is a student in the educational psychology course. He, like several students, included within the assignment a reflection on the impact of "Mr. Rogers' Neighborhood" in their own childhood, "I remember watching the show when I was little, and the article made it feel like all the episodes I watched had a foundational impact in who I became today" (Rausch, personal communication, 2020). Other students echoed this reaction, commenting on the influence Rogers had on them, both as future teachers and, for some, as parents. Students also identified connections between Rogers' methods and learning theories, "Mr. Rogers builds a constructivist classroom by helping kids build their knowledge together with what they already know" (Rausch, personal communication, 2020). In general, students found Rogers to be a valuable model of both Constructivism and Social Cognitive Theory, with several students expressing an intent to utilize his methods themselves. Overall, students' assignments and discussion responses indicated that the assignment fulfilled the two main purposes of an FE: 1) students viewed Rogers as a teaching exemplar, and 2) students were able to critically analyze the episodes using Educational Psychology theory.

IMPLICATIONS

With many states facing the possibility of school closures throughout 2020, EPP faculty may need to look beyond the traditional classroom to find opportunities for students to apply their knowledge. In addition, a growing number of EPPs are seeing an increased demand for online and summer courses, which also limit the opportunity to place students within schools. The use of video observation has been shown to benefit preservice teachers (Cuthrell et. al., 2016; van Es et. al., 2017; Watters, Diezmann & Dao, 2018). However, EPPs may not have access to classroom videos, especially on short notice. Carefully selected television shows, such as "Mr. Rogers' Neighborhood", which are widely available, can serve as a viable solution. In this case, Rogers was used within an educational psychology course, but applications throughout educator preparation, such as early childhood and methods courses, could be explored. Further, a number of television shows (e.g., "Sesame Street", "Bill Nye the Science Guy", etc.) that are publicly available have applications throughout education programs as well.

Through the experience of using "Mr. Rogers' Neighborhood", the authors learned valuable information about implementing such activities to replace classroom FEs. Foremost, the examples used must fulfill the purposes of the FE for that particular program. In our case, as for many EPPs, the main purposes were to expose students to a teaching exemplar (American Association of Colleges for Teacher Education, 2010; Hughes & McCartney, 2015; Warner & Hallman, 2017) and to allow them to analyze instruction through a theoretical lens (Allen & Wright, 2014; Joyce-Beaulieu, 2017; Rouse & Joseph, 2019). Fred Rogers, and his television show, fulfilled these purposes. However, some courses, or whole EPPs may have different or additional purposes. For example, methods classes may need to seek out examples specific to the content area. Or EPPs with an intentional focus on diversity may need to seek out diverse teaching exemplars. Further, any related assignments or activities should direct students to reflect on these purposes (Kalchman, 2015; Yesillbursa, 2011). Our assignment (see Appendix A) does so by asking students to reflect on Rogers as an exemplar and to analyze his methods using relevant educational psychology theories. Similar assignments designed by others should also stem specifically from the intended purposes of their FE (e.g., asking about content-specific instructional strategies or impacts of a diverse exemplar). In addition, where possible, assignments should assess the skills and understandings that are typically assessed in conjunction with the traditional FE (Allen & Wright, 2014). For example, the evaluation criteria

(see Appendix B) used in this case were driven by the original assignment for the traditional FE. Prior to the closure of schools, students in the course were asked to analyze classroom observations using educational psychology theory as well. The evaluation criteria for this activity were an adaptation of those criteria. This ensures that the adapted activity still fulfills the original purposes of the FE. An unexpected outcome of the assignment was the timeliness of Rogers' methods given the COVID-19 pandemic. Students noted that Rogers' instruction regarding emotional public events and trauma impacted them in light of current events. Instructors intending to create similar assignments should also reflect on any possible unintended consequences or hidden curricula of examples used within an EPP course.

FUTURE RESEARCH

Unfortunately, given the urgency of the shift to online instruction in March 2020, it was not feasible to collect research data on this activity. However, future use of this activity should evaluate its efficacy. Anecdotal evidence suggested that students received benefits similar to a traditional FE by analyzing "Mr. Rogers' Neighborhood", but empirical results are needed to confirm that impression. Future research should investigate students' perceptions about the extent to which the activity fulfilled its intended purposes, especially in comparison to a traditional FE. A qualitative methodology would allow students to reflect on the impacts of a nontraditional observation on their learning and overall development as a future educator.

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1. <u>Read the article:</u> "<u>How the Science of Learning is Catching up to Mr. Rogers</u>" (feel free to click any of the links in the article, many of them are quite interesting!).

2. <u>Watch</u>: at least one episode of "Mr. Rogers' Neighborhood" (<u>available here</u> or <u>here</u>).

3. <u>Write</u>: on the following:
   1. Write a **reflection** on the article (at least 1 paragraph). Include:
      a. <u>Personal reactions</u>
         Consider:
         i. *Did you have any emotional reactions to the article?*
         ii. *If you're familiar with Mr. Rogers' show, does this change your perspective about it or other shows for children?*
         iii. *Any other thoughts, feelings, opinions, etc.?*
      b. Any <u>connections</u> to course content you recognized (I'm sure you can come up with at least one!)
         Did you notice any theories or strategies we discussed in the class? If so, make clear and direct connections between the article and course content.
   2. Analyze how you see the following <u>applied</u> in the episode you watched (be sure to include the name of the episode(s) you watched). Make **clear and specific connections** between course content and examples from the show:
      a. <u>Constructivism theory</u> (1 paragraph)*:*
         i. Is Mr. Rogers' show a better example of cognitive or social constructivism? Why?
         ii. How does Mr. Rogers use the principles of constructivism? If there are principles you do not see in the show, how could a teacher or parent expand on the show to include those principles?
         iii. How is Mr. Rogers' Neighborhood a "constructivist classroom"?
         iv. How does Mr. Rogers build a "community of learners"?
         v. What applications of constructivism are used in the show (i.e., incremental review of information, problem based learning, concept change, scaffolding, etc.)?
      b. <u>Social cognitive theory</u> (1 paragraph)*:*
         i. How is modeling used in the show? What type of modeling? How effective was the model?
         ii. How is observational learning used in the show?
         iii. How does Mr. Rogers promote self-efficacy?
         iv. How is self-regulated learning taught in the show?

	Incomplete	**Unsatisfactory**	**Basic**	**Satisfactory**	**Proficient**
Article Reflection Reflection on the article, "How the Science of Learning is Catching up to Mr. Rogers".	Reflection on the article is missing and/or incomplete.	Reflection on the article is limited in depth.	Reflection on the article is insightful and thorough. No connections between the article and course content are made.	Reflection on the article is insightful and thorough. One connection to course content is included, but the connection is weak or unclear.	Reflection on the article is insightful and thorough. At least one thoroughly described connection to course content is included.
Episode Analysis: Constructivism Analysis of applications of Constructivism Theory in episode(s)	Analysis is missing and/or incomplete.	Analysis is limited in depth.	Analysis makes connections between course content and examples from the episode to demonstrate components of Constructivism Theory (i.e., cognitive vs. social constructivism, principles, community of learners, etc.) but clarity of connections needs improvement.	Analysis makes clear and direct connections between course content and examples from the episode to demonstrate components of Constructivism Theory (i.e., cognitive vs. social constructivism, principles, community of learners, etc.) but support of analysis is weak or unclear.	Analysis makes clear and direct connections between course content and examples from the episode to demonstrate components of Constructivism Theory (i.e., cognitive vs. social constructivism, principles, community of learners, etc.). Analysis is supported by strong, well described logic.
Episode Analysis: Social Cognitive Theory Analysis of applications of Social Cognitive Theory in episode(s)	Analysis is missing and/or incomplete.	Analysis is limited in depth.	Analysis makes connections between course content and examples from the episode to demonstrate components of Social Cognitive Theory (i.e., type and effectiveness of modeling, observational learning, self-efficacy, self-regulated learning, etc.) but clarity of connections needs improvement.	Analysis makes clear and direct connections between course content and examples from the episode to demonstrate components of Social Cognitive Theory (i.e., type and effectiveness of modeling, observational learning, self-efficacy, self-regulated learning, etc.) but support of analysis is weak or unclear.	Analysis makes clear and direct connections between course content and examples from the episode to demonstrate components of Social Cognitive Theory (i.e., type and effectiveness of modeling, observational learning, self-efficacy, self-regulated learning, etc.). Analysis is supported by strong, well described logic.

Pre-service Teacher Education Methods and Pedagogy

Lessons Learned from the Transition to a Virtual Instructional Technology Course for Elementary Preservice Teachers

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This chapter describes modifications to an instructional technology (IT) course for elementary preservice teachers (PSTs) when the course transitioned online Spring 2020. Recommended changes include synchronous online meetings, device-specific training sessions (Apple, PC, or chromebook), and the use of student choice and project-based learning. Descriptions of assignments modified for this online format and instruction during the pandemic including a technology tools spreadsheet, instructional movie, writing a children's text, a social studies menu, reflective discussions, and completing a project-based inquiry are included. Results of the TPACK survey yielded statistically significant increases for PSTs. Virtual office hours for one-on-one assistance were helpful; however, students gradually transitioned to googling how to find their own answers in the online format which is not often observed in the traditional course. PSTs integrated and applied knowledge of the TPACK framework and SAMR model into the rationale for their culminating lesson plans for the course.

Keywords: Instructional technology, elementary preservice teacher education, TPACK framework, SAMR model, project-based learning, virtual instruction, blended learning

INTRODUCTION

This chapter describes the transition of an IT course for elementary PSTs from traditional (Phase I) to online format (Phase II) during the COVID-19 pandemic. Both phases were designed based upon social constructivism theory regarding how students learn best through collaboration, using prior knowledge to construct new knowledge, project-based learning, and opportunities to develop a growth mindset through challenging activities and opportunities for revision (Dewey, 1938; Dweck, 2017; Vygotsky, 1978). PSTs were challenged to reflect upon activities they developed using the Technological Pedagogical and Content Knowledge (TPACK) Framework and Substitution Augmentation Modification Redefinition (SAMR) Model (Koehler, Mishra, & Cain, 2013; Puentedura, 2014). TPACK, Figure 1, builds on the work of Shulman (1986) focused on subject-specific pedagogical content knowledge with the incorporation of technology.
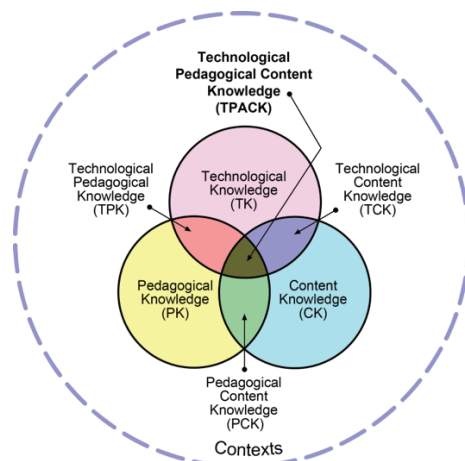
Figure 1. The TPACK Image. Reproduced by permission of the publisher, © 2012 by tpack.org.

SAMR, Figure 2, is used to evaluate digital technology use in the classroom. The challenge is for teachers to develop tasks at the Modification and Redefinition levels in the Transformation section, which leads to greater student engagement and ultimately increased student achievement.

Enhancement		Transformation	
Substitution	**Augmentation**	**Modification**	**Redefinition**
Technology acts as a direct substitute, with no functional change	Technology acts as a direct substitute, with functional improvement	Technology allows for significant task redesign	Technology allows for the creation of new tasks, previously inconceivable

Figure 2. The SAMR Model.

INNOVATION

Thirteen PSTs enrolled in the course which met for three-hours weekly. Figure 3 shares basic details of Phase I & II. TPACK and SAMR models were introduced during Phase I and PSTs referred to them throughout the semester.

Phase I - Traditional Format **Duration**: 8 Weeks	**Phase II** - Synchronous & Asynchronous Online Format **Duration**: 7 weeks

Assignments
• Screencast for current technology trends
  o Screencastomatic or Screencastify & Blendspace
• Interactive whiteboard flipchart
  o ActivInspire software
• Google Form survey and preparation of a newsletter with Canva
• Class Response Systems
  o Kahoot & Quizizz
• Classroom management/organization site
  o Class Dojo and Google Classroom
• Computational thinking webquest with block-based programming and coding Lego◊ Education WeDo 2.0 robots
• Download and print a 3D object from Thingiverse
• Digital citizenship project incorporating children's tradebooks
  o Short video reading book with questions for students included. Created a QR code to scan & play video.
	Assignments
	• Technology Tools Spreadsheet
	  o Assessment, blogs, curation, photo editing, mathematics and science simulations, virtual mathematics manipulatives
	• Social Studies Menu
	  o Appetizer: Padlet, Cartoon, or Concept Map
	  o Main Course: Infographic or Google Maps Tour Builder
	  o Dessert: Flipped Video EdPuzzle, TEDed or StoryCorps Interview
	• Inquiry Project
	  o 3D printing Tinkercad
	  o Robotics: Wonder Workshop's Dash robot and Lego◊ Education WeDo 2.0
	  o Write an interactive informational text for children: iBooks Author or BookCreator app
	• Instructional Video Project
	  o iMovie, Windows 10 photos app, or WeVideo
	• Reflective discussions
	  o Flipgrid
	• Lesson Plan
	  o Google Docs Template, collaboratively written, reflection of TPACK & SAMR

Course syllabus, schedule, assignment instructions as well as modified schedule are included on the course Google Site and each student created a Google Site to house artifacts. See Appendix	

Figure 3. Phase I and II of Instructional Technology Course.

We used the cloud-based video platform, Zoom, and features such as participant visibility, screensharing, and breakout rooms made it ideal for classes during Phase II. Assignments for Phase II aligned with standards and indicators from the National Standards for Quality Online Teaching (NSQOT) including professional responsibilities, digital pedagogy, community building, learner engagement, digital citizenship, and diverse instruction (QM & VLLA, 2019). Brief descriptions of Phase II assignments follow.

Technology Tools Spreadsheet

The *Teacher's Guide to Tech 2019* served as our textbook to select unexplored technology categories during Phase I (Gonzalez, 2019). Each PST was assigned different tools and created artifacts added to his/her Google Site. The PST wrote reviews using a shared Google spreadsheet.

Social Studies Menu

This assignment served a specific need to develop social studies content knowledge and PSTs selected a challenging standard and completed a range of activities using digital tools for a learning menu (ISTE, 2017). Appetizers were designed to unpack content, main courses presented concepts, and desserts involved creating video for flipped classrooms. An alternative, to take advantage of isolation at home, was to interview a family member (StoryCorps, 2020).

Inquiry Project

This assignment provided investigations with robotics and 3D printing introduced during Phase I if they chose to pick-up the equipment. PSTs who didn't feel comfortable due to social distancing measures, could choose to write a children's book (Encheff, 2013; Lin, Widdall, & Ward, 2014; Zakrzewski, 2015). Two selected 3D printing, one robotics, and 10 wrote books. Using 3D printing as part of elementary PST coursework has been shown to improve PST attitudes about teaching science and their science content knowledge (Novak & Wisdom, 2018). The students with 3D printers designed their own 3D object and printed "earsavers," that prevent ear strain from masks, to assist health-care workers (NIH, 2020). The PST working with robotics located subject-specific lessons and documented activities. Embedding computational thinking practices within curriculum through coding and design with robotics and 3D printing provides opportunities to better prepare students to meet the future needs of the job market (CSTA, 2016; Grover & Pea, 2013; ISTE, 2017; McGinnis et al., 2020).

Instructional Video Project

Videos are a powerful platform of entertainment and learning for children; therefore, it's ideal for PSTs to create videos and teach students to become producers rather than just consumers of this media (Lin, Widdall, & Ward, 2014). They individually or collaboratively created a video about current or historical events, science, or mathematics concepts (Fehn & Heckart, 2013; Hechter & Guy, 2010). Collaborative teams gathered footage separately and shared video using a Google Drive folder and PSTs edited final videos on their own computers. They used pets, family and real-world settings on topics ranging from telling time, culture of the 1920's, jobs in the community, to a conversation with a pet about COVID-19.

Reflective Discussions

The class participated in two asynchronous reflective discussions. The first focused on how their online presence can positively or negatively impact their future careers as teachers. For the second discussion each PST was assigned a different technology-based article and asked to briefly share how they could use the ideas for their culminating lesson plan.

Lesson Plan

PSTs worked in groups of 2-3 to write a science, social studies, or mathematics plan that integrated technology. They used a template and included a reflective statement about TPACK and SAMR models. Teams used breakout groups to provide feedback to each plan prior to feedback from the instructor.

RESULTS

The TPACK assessment was used to collect quantitative data regarding changes in PSTs beliefs over the semester (Schmidt et al., 2009). This assessment included 46 Likert-scale items divided into seven constructs of knowledge: technology (TK), content (CK), pedagogy (PK), pedagogical content (PCK), technological pedagogical (TPK), technological content (TCK), and technological pedagogical content (TPACK). Each item is scored with a value of 1 for strongly disagree, up to 5 for strongly agree. The participant responses were averaged over all 46 questions and over each construct. For example, the six TK questions are averaged to produce one TK score. A two-sample T-test was computed for the participant's average responses over all the questions to show a significant change ($p = .0000159$). Separate two-sample T-tests were performed on each construct with a Bonferroni correction to determine statistical significance of changes. Two constructs were statistically significant at $p < 0.05$ including TK & CK; one at $p < 0.01$, TPACK; two at $p < 0.001$, PCK and TCK; and two did not show significant change, PK and TPK. Note that 10 of the 13 participants completed both the pre and post TPACK assessment using a Google Form with results shown in Table 1.

Table 1
Pre and Post TPACK Assessment Results

TPACK subscale	Pre-Test		Post-Test		
	Mean	Std. Dev.	Mean	Std. Dev.	p value
TK (6 items)	3.2	0.79	3.98	0.29	0.0018
CK (12 items)	3.64	0.41	4.19	0.33	0.0026
PK (7 items)	4.06	0.56	4.44	0.43	0.0116
PCK (4 items)	3.75	0.40	4.33	0.40	0.00007
TCK (4 items)	3.33	0.63	4.63	0.44	0.00004
TPK (9 items)	4.2	0.41	4.51	0.34	0.032
TPACK (4 items)	3.48	0.47	4.4	0.44	0.0005

Open-ended questions added to the post-TPACK asked participants to describe the most and least useful aspects of Phase II. All student responses were positive and several stated that everything was helpful. A sampling of student responses categorized by themes along with the number of students who mentioned the theme is included in Table 2.

Table 2
Top Takeways from Phase II of Instructional Technology Course

Theme	Representative Quotes
Zoom Sessions *n*=10 *Note*: 7 described clarity of assignment instructions and 4 described device-specific sessions within Zoom meetings.	• *I feel like you used Zoom extremely well. I did not feel like I was "cheated" out of the education I paid for because you provided us so many opportunities to come to you for help via zoom or email. You used our meeting times efficiently, and I feel like it was very helpful.* • *The most helpful was assignment instructions during the zoom meeting and the device- specific sessions. Having the device specific sessions really saved all of us a lot of time!* • *Zoom breakouts were helpful because we had a chance to discuss better. Assignments instructions were very clear, so I didn't spend a lot of time trying to figure out what is being asked and how to do it.* • *I think splitting class up to meet the needs of specific device owners was a good idea to eliminate confusion. I always looked forward to the Zoom meetings and always left knowing exactly what to do. Assignment instructions were always clear.*
Technology Tools Spreadsheet *n*=5	• *I found the use of the tech tools spreadsheet the most useful. I enjoyed the spreadsheet and it showed me many different tools I can use in the classroom.* • *I think the tech tools spreadsheet will be most useful because I can look back at the reviews of my classmates (and my own) to refresh my memory on what they were and how they can be used in the classroom.*

Theme	Representative Quotes
Inquiry Book Assignment *n*=4	• *iBook because teachers can create them to use in lessons, students can create them while learning content, or the class can make them as a group journal. They're user friendly and versatile* • *I feel that creating books will be useful for my future career as a teacher because they can be made by me to use with my students year after year. I like that students can also create their own books.*
Instructional Video *n*=3	• *I found all of them extremely useful, but I absolutely loved doing the instructional video and the book. Those were both very fun to make!*
Lesson Plan *n*=2	• *The integrated lesson plan is something I learned from and feel like I grew a stronger understanding of how to create an integrated lesson with technology.*
Teach class as a hybrid on a regular basis *n*=3	• *…there are some aspects of it that were really fun to do in class such as making those robots with Legos…* • *I will say that though this class worked well as an online class, I do feel that it also needs to be taught in person too because of not having easy access to everything. As an example, not enough 3d printers to go around…* • *I thought the class was great all around. I loved the hands-on options we had when the class transferred to online. I would have personally enjoyed having a technology class both fall and spring semester of junior year especially in a hybrid format of online and in-class.*

IMPLICATIONS

Key ideas and lessons learned from transforming a traditional IT course to an online course for elementary PSTs include:

- Use an online cloud-based video platform to deliver synchronous instruction. This provides opportunities for the teacher educator to model how to use software, answer questions, provide immediate feedback, and facilitate PST interactions in whole group and small group breakout sessions.
- Prepare clear instructions for assignments and keep them located in a central place (such as a Google Site) for all PSTs to access. Both written (assignment sheets) and oral (synchronous through Zoom or asynchronous pre-recordings) instructions help clarify requirements.
- Allow opportunities for PSTs to make revisions to assignments they complete as part of online instruction, particularly when the transition is induced by a pandemic (Dweck, 2017). Even with clear instructions, there's potential for misinterpretation and there's an additional amount of stress that coincides with a pandemic which can cause some to not perform to their full potential.
- Take into consideration the different types of computers that PSTs have when planning online instruction which impacts the software available to complete assignments. Additionally, plan specific times to meet based upon the make of the computer to deliver device-specific instruction.
- If possible, plan for hybrid or a combination of traditional and virtual instruction for an IT class. There are a number of tools that are difficult and costly to provide to every PST working remotely such as robots, 3D printers, green screens, and video equipment. It's also helpful to have opportunities to see and interact with students in a traditional setting to develop rapport among students and with the teacher educator.
- Plan virtual office hours to meet with PSTs between scheduled classes as needed. Many assignments in an IT course are difficult to troubleshoot using email. A virtual meeting allows the student and/or teacher educator to share screens and troubleshoot more effectively.
- Emphasize PST choice and authentic learning activities with the use of discipline-specific technologies that can be explored virtually (ISTE, 2016; ISTE, 2017; QM & VLLA, 2019; Schafer, 2020). This includes the choice for PSTs to work individually or collaboratively. Assignment menus that allow for multiple options of digital tools (in this case the social studies menu) or project-based learning with options of tools (in this case 3D printers, robots, or digital book platforms) allow students to take ownership in their learning.
- Explicitly teach TPACK and SAMR models and provide opportunities for PSTs to reflect on how they apply to instructional scenarios and assignments completed throughout the semester.

The Phase II assignments emphasized ways in which PSTs can use TPACK and SAMR models to transform instruction using technology (Koehler, Mishra &, Cain, 2013; Puentedura, 2014). Table 3 includes sample group reflections for TPACK and SAMR included with the culminating lesson plan which required teams to incorporate digital technology they used throughout the entire semester in a meaningful way for elementary students to construct knowledge with rather than from technology (Howland, Jonassen, & Marra, 2013; Vygotsky, 1978).

Table 3
Lesson Plan TPACK and SAMR Reflection Examples

	Representative Reflection
TPACK Reflection 2nd grade plan Topic: Designing 3D models for the life cycle of the frog	*Through this lesson we integrated the TPACK framework. For Technological Pedagogical Knowledge we integrated how to use Tinkercad for 3D printing. We will have an introduction with small groups that will introduce Tinkercad components and how to use them to create a 3D print of the life cycle of a frog. We will also be using materials, such as a smartboard/promethean board to project the introduction. Technological Content Knowledge is also integrated through the use of a smartboard/ promethean board and a 3-D printer to teach the scientific content of the life cycle of a frog. Through the integration of these types of technology, students will be given an alternative way to learn about the life cycle of a frog. Pedagogical Knowledge and Pedagogical Content Knowledge can also be found through the use of direct instruction in the introduction of Tinkercad for 3D printing and how to use it. Throughout the lesson we are integrating Inquiry-based instruction through the use of Tinkercad and a 3D printer.*
SAMR Reflection 4th grade plan Topic: Write books about different groups in Revolutionary War using BookCreator app	*Through this lesson, we are redefining ways students learn about the American Revolution and the many groups associated with it and their differing viewpoints. Through the use of the application, Book Creator, students will be creating their own book, covering one of the groups. This style of book allows the students to be interactive and watch videos, as well as adding definitions and widgets to further their understanding. If the students were to create a book using paper, they would not have all of these tools to work with.*

FUTURE RESEARCH

Ultimately it will be helpful to determine if PSTs apply what they have learned with elementary students. This course modeled strategies for online instruction and required creation of artifacts demonstrating learning with technology (Howland, Jonassen, & Marra, 2013). I will continue to use these strategies in future IT courses and compare TPACK performance. To improve on this semester's innovations, I intend to find ways for PSTs collaborate with children in the traditional classroom or virtually. I plan to invite IT experts including classroom teachers to share their experiences. There are barriers for PSTs to attend conferences and for experts to attend university classrooms; however, knowledge can be disseminated if meetings such as these are arranged virtually. I also plan to explicitly introduce the PSTs to NSQOT (QM & VLLA, 2019). These are valuable for prospective teachers because future teaching will likely include blended and virtual learning settings beyond the classroom. For example, blended synchronous learning can take several different formats such as virtual flipped classrooms, student-facilitated approaches, and hybrid approaches with some students on-site and others at remote locations (Zydney, McKimmy, Lindberg, & Schmidt, 2019).

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APPENDIX

Assignment descriptions and schedule before and after COVID-19 lead to the transition to online teaching can be located at the course Google Site:
https://sites.google.com/view/foed-3010-technologyspring2019/home
Image of Course Site with Tabs
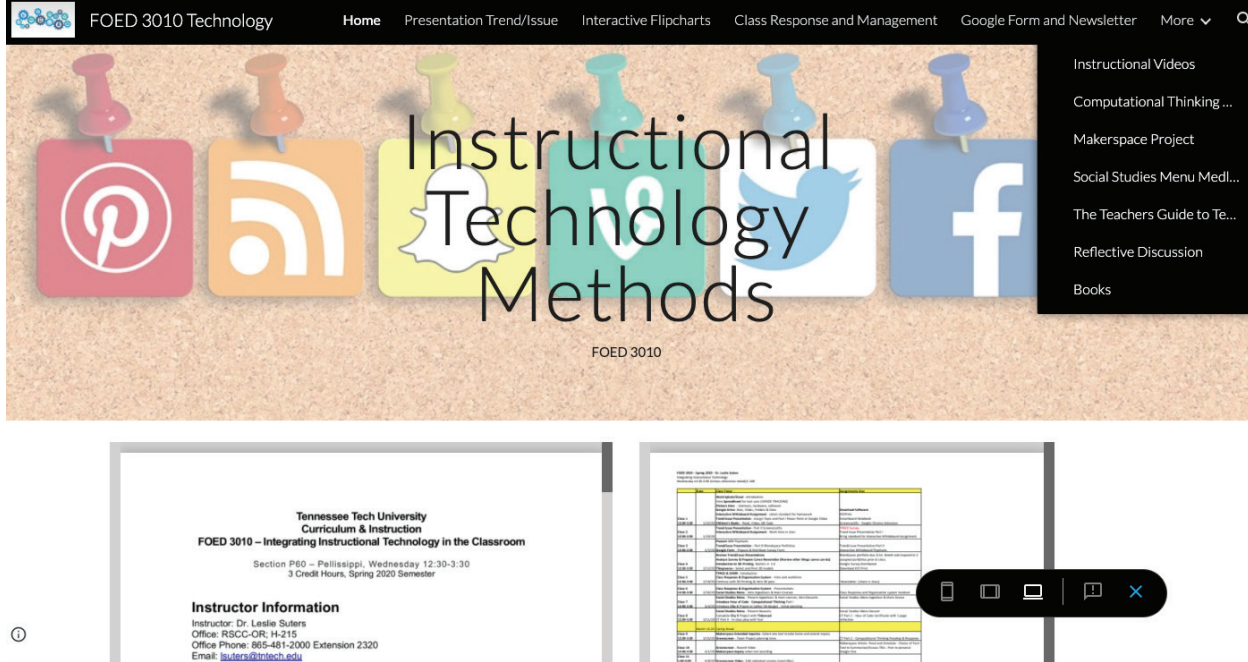
Student artifacts can be located at their Google Sites.
Example 1: https://sites.google.com/view/latyra/home

Example 2: https://sites.google.com/view/jacquelynportfolio/home

Additional Assignments and examples not included on the Course Google Site

Phase I

Digital Citizenship: https://drive.google.com/open?id=17898kuDXhRu82nCaM9kjkDsyauRPgG55

Phase II

1. Inquiry Project

Robotics https://drive.google.com/open?id=1-osVDbxdD7fSWHrH0BCn6QObOl2w9xw5 3D 3D Printing https://drive.google.com/open?id=1P4IxjtuA4Rwatb92p5NGouI-tCFuTGf4aubAihIVOiw

2. Instructional Video Examples (includes script/outline; standards and preliminary research and video)

A Conversation about COVID 19 https://drive.google.com/open?id=17gG7V5mh8CnUNcCwynexsxIjQ3QHPP6f

Culture of the 1920's https://drive.google.com/open?id=1y9_Zt4BBqufeSeKfv60EWdMiO4ud2r0M

3. Lesson Plan (Includes lesson plan templates, grading rubric, and group lesson plans)

https://drive.google.com/open?id=1Wwx72-MLSRApaxGsSR0JecFjyPxotucy

Using Coding to Go Beyond Skill Based Mathematical Learning: Expanding the Arc of Online Mathematics Teaching and Learning in an Era of Emergency COVID-19 Online Teaching

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The teaching and learning of mathematics is often seen as a skill-based content area for many preservice teachers. However, mathematics is a highly creative discipline requiring flexible, adaptive, and logical thinking to understand complex problems; traits that are also found within coding. As such, and given the need for many teachers to move instruction to online platforms based on the COVID-19 pandemic, this chapter provides a rationale for supporting pre-service teachers with integrating coding experiences with mathematics in online contexts to support K-12 students' technical habits of mind. Examples of useful coding resources are provided along with suggestions for implementation based on early results from our teacher preparation program's ongoing use of coding in online and face to face settings. Implications from our current experiences and recommendations for future research are offered as well.

INTRODUCTION

The availability of high quality online resources for learning mathematics is abundant though the kinds of materials many pre-service teachers (PST) look for (i.e. teacher developed) are often not high quality or aligned to learning outcomes such as local or national standards (Polly, 2016; Porcello & Hsi, 2013). Furthermore, the learning of mathematics means learning to think and behave like a mathematician and this means helping students attend to these mathematical habits of mind (Dolk, 2018). The rapid and emergency movement to online teaching of mathematics, as a result of the COVID-19 pandemic, has magnified this issue for PSTs as many PSTs already have a fragile self-efficacy with respects to teaching mathematics in a complex, inquiry-based, and student-centered approach (Giles, Byrd, & Bendolph, 2016).

Supporting Theory and Research

Figuring out theoretical and research supported ways of countering this problem is imperative. One way of doing so is via the use of coding activities, which are grounded in an understanding of the social and intellectual learning environment (Piaget, 1959; Vygotsky, 1986), learner engagement (Bandura, 1993), and self-efficacy (Bandura, 1986). Integrating coding into online instruction allows PSTs to positively motivate and guide learners to specific and meaningful understanding, skill acquisition and self-efficacy (Bandura, 1977). Additionally, coding, and other related technology and computer engineering based learning experiences, allows for the development of the technical ways of thinking needed across STEM content areas (Bennett & Ruchti, 2014) thereby directly supporting students' mathematical thinking.

Agreement about coding as a necessary component of 21st century learning has become more pronounced (Ensign, 2017; Falloon, 2016; Moreno-León, Robles, & Román-González, 2016). That is because coding is grounded in computational thinking, a foundational way of thinking, disaggregating and repurposing problems using computers as inquiry and problem-solving tools (Johnston, 2019). Teaching coding goes well beyond the content of mathematics as it helps PSTs

develop lessons that require students to take evidence-based and logical positions to propose solutions to complex problems (Grover & Pea, 2013). Whether offered fully online or using commonly available offline materials, PSTs can use coding activities to help students develop strong problem solving and critical thinking strategies.

Because coding focuses on thinking and reasoning, the same skills used to develop and support productive mathematical thinking (Calao et al., 2015), learning experiences that incorporate coding are ideal as they develop technical skills, productive mathematical behaviors, and the transfer of understanding to other settings (Grover & Pea, 2013; Scherer, et. al, 2018). Additionally, coding experiences require PSTs reflect on the "why," or the process, connections, and structural relationships, and not just on obtaining correct answers.

INNOVATION

There are multiple high-quality resources available for teachers wanting to incorporate coding into their online classrooms (e.g., Logo, Scratch and CodeAcademy). However, two examples stand out for their ease of use and learning both of which matter when many PSTs have limited understanding of the nature and benefits of coding (Yadav, Mayfield, Zhou, Hambrusch, & Korb, 2014). These two resources are Code.org and Khan Academy.

Code.org

Code.org offers a variety of online and off-line coding activities for K-12 teachers and learners (https://code.org/). Options for off-line coding allow teachers to address issues of limited or no digital access. This is of particular importance given the range of field experience and practicum contexts (e.g., rural and urban) PSTs may encounter. Complexity of use and understanding can be built across time using the various free materials available from this organization.

Khan Academy (http

Khan Academy, in cooperation with Code.org, offers courses in computer programming appropriate for secondary mathematics education (https://www.khanacademy.org/computing/computer-programming). This is of particular importance as much of the planning and development of lessons does not fall on the pre-service teacher and they can thus focus more on developing their pedagogy for the learning experiences. Students can learn and practice concepts and then apply their understanding to the development of coding projects. One of the strongest features is that videos and tasks can be imported directly into Google Classroom allowing PSTs to quickly develop and integrate lessons online. Additionally, students can use hardcopy and online resources to complete coding tasks. This is important in communities that lack reliable connectivity and it can provide flexibility for PSTs in practicum experiences that are teaching online or in a blended context.

With an abundance of resources for teaching mathematics online that only focus on procedural skill development and factual "answer-getting," the need to use resources to support mathematical thinking is imperative. These coding resources center on the technical ways of thinking needed across STEM careers and thus develop a more robust and complex way of thinking about and doing mathematics.

RESULTS

Prior to, and throughout the instructional shift to emergency online teaching (EOT), we have been using coding to support PSTs as they learn how to teach mathematics. As a part of this work, we follow a process involving four key phases (see Table 1). These four phases include an initial inventory gauging readiness and understanding of coding as it relates to teaching mathematics. The second phase involves engaging in low-tech coding activities to support creative and adaptive thinking but in a less intimidating and more amenable way for educators new to teaching coding (Krauss & Prottsman, 2017). Phase three transitions to using Code.org and Khan Academy to consider instruction within a synchro-

nous or asynchronous learning environment for teaching mathematics. Lastly, PSTs reflect on this process and relate the experiences back to mathematical habits of mind desired in learners of mathematics.

Table 1
Description of the implementation using a four-phase process

Phase	Rationale & Intended Outcome
1. Initial Reflection	- Identify issues that might impact their willingness to code and integrate it into our instruction. - Completed online using our learning platforms discussion forum. - PSTs reflect on: 1) understanding of coding, 2) beliefs about coding, 3) efficacy of coding as an instructional approach in mathematics and 4) their self-efficacy in teaching coding.
2. Low-Tech Coding	Engage in coding activities that include: 1) robotics, such as Ozobots, 2) drag and drop coding software (Pierce, 2013), such as Lightbot, and 3), off-line coding activities (Kraus & Prottsman, 2017).
3. Integrating Coding & Mathematics for Learning	- Engage with Hour of Code (on Code.org). - Reflect on the nature of mathematical learning through coding.
4. Final Reflection	- PSTs virtually discuss with peers the nature and nuances of their learning as it relates to integrating coding and mathematics into their instruction. - Whole-class discussion (facilitated by instructor) on emerging ideas and implications (Ray, Rogers, & Hocutt, 2020).

IMPLICATIONS FOR PRACTICE

Coding provides PSTs ideal opportunities to support students in developing the complex thinking and technical skills needed in mathematics during distance delivery resulting from the COVID-19 pandemic. Yet, helping learners acquire these skills is also critical beyond the immediacy of the pandemic. This means, despite the complexity and challenges faced with moving instruction online, the opportunity to develop students' productive mathematical habits of mind, problem solving skills, and other STEM related skills through coding is ripe. Thus, it is important for teacher educators to consider these implications as they work to prepare their PSTs during online clinical teaching.

Learning how to develop and facilitate lessons that include coding and computational thinking pushes PSTs into a realm of complex thinking and problem solving that mirror the very tasks they will ask of their learners (Pérez, 2018). It also allows them opportunities to see how coding supports mathematical thinking and is transferable into many other content areas (Kellinger, 2020). While scaffolding the experience for students is important even beyond this era of EOT, neither teacher educators nor PSTs need to be coding experts before doing so (Krauss & Prottsman, 2017). Once acquired, these perspectives promote confidence to explore, experiment, and transfer new innovations into practice (Ray, Rogers, & Hocutt, 2020); skills that will carry PSTs well beyond this immediate need to adapt to a pandemic.

Asking our PSTs to develop coding lessons is tantamount to asking them to think deeply and reflect on mathematics content and about how learning occurs within technical content areas (Kim, Kim, Yuan, Hill, Doshi, & Thai, 2015). It also asks them to identify and reflect on the most important learning even as they plan lessons that help them see what that learning is, how it occurs, and how to integrate it into their future practice. Again, a disposition to think in these ways, when established, transfers into their consideration of other issues that emerge across their careers in education.

FUTURE RESEARCH

Future research should center on the efficacy of coding as an online mathematical learning tool. Likewise, perceptions of efficacy among PSTs using this learning strategy should be examined as should the entire move to emergency

K-12 online mathematics instruction. Engaging in a process of reflective action research will allow teacher educators to adapt as needed even as they document a process that can be shared with others.

Understanding our successes and challenges during times of uncertainty is vital to knowing where we stand as a profession. However, good practice is still good practice. Exploring the successes and challenges involved in shifting rapidly to EOT will be interesting for educational historians, instructional and curriculum designers, and other teacher educators to learn about. Afterall, EOT is an ongoing, vast non-scientific experiment launched without prior planning or research consideration. Much can be learned by reflecting on and documenting what occurred. However, when doing so, it is important for teacher educators to recognize that EOT is not automatically the same thing as online instructional design and teaching, which as a field was shaped by over 30 years of research on how learning occurs in online settings. Teacher educators will need to review this emerging field of academic inquiry to better position their studies to contribute new knowledge to the field.

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Innovative Design Revisions on an Undergraduate Technology Integration Course for K-12 Preservice Teachers

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This chapter discusses the innovative design revisions on an undergraduate technology integration course in the College of Education's teacher preparation program at a Southwestern University in the US. Due to COVID-19 pandemic, specific issues emerged-1) the course was taught for seven weeks instead of eight, and 2) with students experiencing a shift to all online learning, it was anticipated that students, who are mostly preservice teachers, would experience potential stresses that could impact student participation and success. Revisions were made related to technology tool use, modular design and streamlining of activities. Further, the course design and content incorporates Technological, Pedagogical, and Content Knowledge (TPACK) Framework. In the first iterations of this course, TPACK was an awareness topic while in this iteration, it was incorporated as a primary topic. In addition, implications of the revisions include the importance of student-centered course design and use of social media platforms for learning.

INTRODUCTION

Integrating Technology with Teaching (ITT) is an 8-week undergraduate online course in a College of Education's Teacher Education Program (TEP) for preservice teachers. Preservice teachers have limited opportunities to practice using technology tools for K-12 teaching (Francom, 2020; Parra, Woodley, & Lucero, 2018). ITT provides preservice teachers with hands-on learning opportunities using technology. In spring 2020, due to the COVID-19 pandemic, the university took an extra week for spring break allowing instructors to change courses for emergency remote learning. This course was revised keeping two issues in mind, 1) the course was taught for seven weeks instead of eight, and 2) with students experiencing a shift to all online learning, it was anticipated that students would experience potential stresses that could impact participation and success. The TPACK framework (Kohler & Mishra, 2009) that supports an understanding of the complex interactions between technological, pedagogical, and content knowledge, guides this work.

INNOVATION

The ITT course was redesigned to address time constraints and the concerns that students faced due to learning shifted to all online and issues such as serious family concerns (Zhang & Ma, 2020). Revisions occurred in the context of TPACK Framework and included:

Webinar tool-The instructor conducted live webinars at the start of each course module to discuss module topics, instructor expectations and enhance learner participation. Previously Adobe Connect was used for the live webinars. The instructor switched to Zoom® (Zoom Video Communications Inc., 2016) to provide students the experience and support of using the same tool as being used in other courses, resource materials and discussions of related concepts such as Zoombombing (Aguilera, 2020).

Module revisions-The course originally had eight modules. The course was analyzed to identify the most critical aspects for supporting the course learning goals (Appendix A) and was modified to six modules (Appendix B), Modules 1-5 were required and the sixth was optional.

Activity Revisions-Activities within the modules were revised, including:

- Previously an add-on, TPACK in this course is incorporated as a primary topic.
- The role of Twitter is increased and used for posting end of module reflections as tweets instead of full discussion posts. Students used class and topic hashtags, and interacted with the others through replies (Appendix C).
- Discussions were modified related to time constraints and best possible student-student and student-content interaction (Luo, Zhang & Qi, 2017). For example, there is a common practice for students to create a post and then provide 2-3 replies. Students have noted that this can be ineffective when time is limited and no one reviews the replies. Different strategies are being developed by the instructor such as instead of replies, students create a summary post of new learning from each other (Appendix D).
- Instead of purchasing texts, the instructor and students collaboratively create a Class Handbook using Google Docs (see Table of Contents in Appendix E). This has become an activity that students reflect on as an important takeaway. In accordance and to streamline resource access, Class Handbook instructions were enhanced and it was integrated in every module (Appendix F).

RESULTS

This qualitative autoethnographic research (Chang, 2016) involved data collection through:

1) Reflective conversations in Zoom between the researchers who are instructors for ITT in Spring 2020 were recorded and analyzed. One instructor taught the course for the first 8-weeks of spring and the other taught during the second eight/seven weeks during emergency remote teaching.
2) The course that was archived in the learning management system used by the researchers to identify the design innovations implemented.

The results of this research observed include:

- The provision of technology support, especially as related to live/recorded webinars using Zoom was perceived as critical for student engagement and success. The webinars were highly attended or viewed as recordings and students expressed gratitude for them.
- The reduction of course work was shared with students and supported student completion of work. Providing the final content module as optional gave students more time to complete previous modules and many students used that opportunity. Some even completed work in the optional module.
- The TPACK framework continued to provide a strong foundation for growth of the preservice teachers' technology integration in the teaching process as was demonstrated from students' TPACK activities and final presentation.
- Twitter became increasingly important in this course iteration as a platform for interaction and reflection. Students tweeted at least twice in each module and often noted how this was impacting their thinking about social media use and networking.
- Every student added multiple resources in the Class Handbook and this was noted as a key takeaway as both a resource and model for future teaching and learning.
- Interaction and collaboration in various ways such as discussion, tweets, webinars, and a team project fostered a knowledge building and online learning community.
- Of note, the instructor found that students' grades showed 88% of the students completed above 90% of the course work.

IMPLICATIONS

This chapter highlights a few innovations and their outcomes including a) the use of TPACK for course design and content, b) student-centered course design that takes into consideration the ever changing needs of students, and c) social media platforms for learning about digital citizenship and building PLN. Certain implications based on course design innovations are:

TPACK framework for course design and content: The course provides strategies and model activities using the framework of TPACK that others can adapt for teaching preservice teachers in developing essential skills for integrating technology in K-12 teaching (Appendix D). It focuses on providing teachers with opportunities to complete assignments using technology tools and create lessons and activities for K-12 students. The U.S. Department of Education (2016) advocated that preservice teachers should have better understanding of using appropriate technology for their K-12 students. It becomes critical to equip and empower preservice teachers with pedagogical and technological knowledge and practices for teaching in K-12 classrooms (Thompson & Sorbet, 2020). Teachers can effectively transfer their competencies and skills in integrating technology for teaching K-12 students when they are involved in learning by doing and reflecting (Admiraal et al., 2017; Parra, Woodley, & Lucero, 2018). The use of TPACK for course design and as content for preservice teachers continues to be a cornerstone for the ITT course.

Student-centered course design: The instructor considered the Pedagogy of Love, Care, and Hope (Freire, 1993; Hooks, 2000; Noddings, 1984; Parra, Raynor, Osanloo, & Guillaume, 2019) as a critical framework for course design and especially during the COVID-19 pandemic scenario. This perspective keeps students in the forefront of the learning design and experience. In the ITT course, the switch to Zoom, the reduction of course content, continued refinement of course topics, and streamlining of activities demonstrate ways to design and keep student needs and success in mind.

Social media platforms for learning about digital citizenship and building PLN: Schuck, Aubusson, Kearney and Burden (2013) identified the need for teacher educators to implement social media such as blogging, microblogging, and other similar technology mediated activities for preparing future teachers. Carpenter, Cook, Morrison, and Sams (2017) found that use of social media such as twitter facilitates a "personalized, positive and collaborative community" for K-12 educators and expands their PLN (p. 51). It reduces isolation and teaching related overload stress, and develops self-reflection opportunities. As a result of COVID-19 pandemic, the State Public Education Department notified all schools closure on March 27, 2020 (New Mexico Public Education Department, 2020) creating an emergency situation is changing the teaching learning landscape for the K-12 education system. As noted in the ITT course, students can use social media as professionals and can reflect on the issues such as distance barriers and affordances involving student learning and communication in a diverse community. This emphasizes how students who are future teachers can be individually participatory and socially/culturally responsive in the digital world even when isolated in their homes.

FUTURE RESEARCH

This course is the only learning technology course for the teacher preparation program at a Southwestern University in the US. It provides a critical foundation for preservice teachers and is continuously being evaluated by the instructors to ensure it is meeting their needs. For this course iteration, the instructor focused on student-centered revisions to address the issues noted and more use of TPACK and Twitter. Continuing to provide opportunities in using relevant and current technology and developing pedagogical expertise for integrating technology in teaching K-12 students remains our primary goal for this course. As new instructors are on boarded for teaching ITT, we are identifying new ways of thinking and developing the course and a cycle of qualitative autoethnographic research. We will continue to reflect and evaluate with the instructors and students for identifying the best tools and methods of integrating technology in teacher education programs for preservice teachers within the TPACK Framework.

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Course Learning Objectives

1. Identify and access the Mission Critical Materials for this course include the Syllabus, Zoom Webinar Meeting Schedule, Resources for Zoom, Office Hours, and Google Tools.
2. Create a knowledge-building learning community.
3. Read, research, reflect, and summarize on the mission topics of digital citizenship, personal learning networks, cybersecurity, TPACK, social justice in education, and STEM/STEAM/Makerspaces, games in education.
4. Complete collaborative and team-based activities.
5. Demonstrate learning and develop educational resources using teaching and learning technology tools including avatar creation, Google Docs, Google Classroom, Google Slides, Twitter, Canva, makerspace tools, podcasting tools, and more.
6. Reflect on learning.

APPENDIX B

Course Modules

Modules	Assignments	Weighting
Mission 1: Getting Started	· 1.1. Mission 1 Overview - READ THIS FIRST! · 1.2. Webinar 1: Course Orientation. · 1.3. We are Superheroes! (TWO DUE DATES) · 1.4. Learn to Screencast & Screenshot, · 1.5. Setup Canvas and Google Accounts · 1.6. Setup Google Classroom · 1.7. Future Teaching Infographic · 1.8. Twitter Account and Reflection	19%
Mission 2: Digital Citizen-ship, PLN, & Cybersecurity	· 2.1. Mission 2 Overview · 2.2. Webinar 2 · 2.3. Readings & Handbook Contribution · 2.4. Reflect, Share, and Summarize for Digital Citizenship, PLN, & Cybersecurity (Two Due Dates) · 2.5. Join Your Teams/Groups · 2.6. Google Classroom Activity · 2.7. Mission 2 Reflection · Optional Extra Credit: Psychology of Grades and an Awesome PLN	19%
Mission 3: TPACK	· 3.1. Mission 3 Overview · 3.2 Mission 3 Webinar · 3.3. Readings & Class Handbook Contributions · 3.4. Share Your TPACK Venn Diagrams · 3.5. Team Contract · 3.6. Google Classroom Activity · 3.7. Mission 3 Reflection · Optional Extra Credit: The Science of Happiness	19%
Mission 4: Social Justice, Technology, and Education	· 4.1. Mission 4 Overview · 4.2. Mission 4 Webinar · 4.3. Readings & Class Handbook Contributions · 4.4. Social Justice Discussion · 3.5. & 4.5a. Team Contract · 4.5b. Team Twitter Top 5 · 4.6. Google Classroom Activity · 4.7. Mission 4 Reflection · Optional Extra Credit: What is #FlipgridFever?	19%
Mission 5: STEM, STEAM, and Makerspaces	· 5.1. Mission 5 Overview · 5.2. Mission 5 Webinar · 5.3. Readings & Classroom Handbook Contributions · 5.4. Mission Makerspace · 5.5. Listen to and Share Podcasts · 5.6. Google Classroom Activity · 5.7. Mission 5 Reflection · Optional Extra Credit: Virtual and Augmented Reality	19%
Mission 6: Games in Educa-tion	· 6.1. Mission 6 Overview · 6.2. Mission 6 Webinar · 6.3. Readings & Classroom Handbook Contributions · 6.4. Gamification Activity & Discussion · 6.5. Create a Podcast · 6.6. Google Classroom Activity · 6.7. Final Webinar Including Student Final Reflections Sharing Slides Optional - Extra Credit: Deconstructing Monument Valley	5% Extra Credit

APPENDIX C

Reflect, Share, and Summarize for Digital Citizenship, PLN, & Cybersecurity

Overview

NOTE: Two Due Dates

In this activity and reflection discussion, we purposely think about adding to our PLNs and reflect on learning and experiences in this Mission. We will think about how digital citizenship and personal learning network (PLN) are interconnected and why these are need to know topics for you?

You have started using Twitter, we have participated in a class webinar about digital citizenship and PLN and you have done readings and research on these topics. I encourage you in being purposeful when adding to your PLN. Great places to grow your PLN include social media accounts and hashtags in Twitter, Instagram, Pinterest, Facebook. But you are not limited. Over time, different tools will be introduced and be less or more useful to you.

So Why Twitter? Twitter remains not only one of the most popular social media tools but also one of the most popular education tools as well! Yes, I said it... EDUCATION. You might be wondering, how can a social media website be used for educational purposes? Twitter is filled with education influencers, companies, and is often used by teachers as a communication tool.

Part 1: Add to your PLN (Due Thursday, April 9 at 10am)

Take some time to reflect upon and analyze your existing PLN and make some key strategic additions. I've added my recommendations in our Class Handbook, the section titled, Class Recommended PLN Contacts > Purposeful PLN Additions.

Add at least one recommendation for the class in the section, Class Recommended PLN Contacts. It can be from Twitter, Instagram, Pinterest, Facebook, etc.

Part 2: Reflect to Connect (Due Thursday, April 9 at 10am)

We have encountered new concepts that are connected. It's important that you make those connections. Let's revisit our previous questions and analysis. Create a post where you reflect and answer the questions from this activity set.

- How are Digital Citizenship and PLN interconnected?
- How does your PLN include and reflect diversity?
- How can your PLN support you as a learner and as a professional?
- What if you see things in your social media that really bother you and you don't want to see that? Do you know how to unfollow, block, etc?
- What was your purposeful PLN recommendation and why should we add it?
- Do you have any questions about these topics?

Part 3: Learning from Each Other (Due Monday, April 13 at 10am)

- Read your classmates' posts and try to learn something new! Take notes as you read. Share a post of new community learning. Your post of new learning should refer to concepts discussed by your classmates and at least three names.

APPENDIX D

Create & Share Your TPACK Venn Diagrams

Overview

NOTE: Two Due Dates

Part 1: Create and Post Your TPACK Venn Diagrams (Due Thursday, April 16 at 10 am) Two Due Dates

In this activity we consider our own TPACK journeys. In Webinar 3, I shared mine, now it's time to share yours. You get to use Canva to create a Venn Diagram of your beginning TPACK journey.

Remember that TPACK stands for Technological Pedagogical Content Knowledge. Consider the following for your post.

1. Take some time to reflect upon and identify your TPACK. You might start with your content knowledge area, then your pedagogical perspective, and finally, your technological ideas.
2. Use Canva for Venn Diagrams.
3. To create your initial TPACK. I had to log in for the link to the Venn Diagram section to work. Remember that you used Canva for Mission 1 to create your Future Teacher Infographics. Of note, you are not limited to Canva. If you would like to use a different tool or hand draw and post your drawing, do what works for you.
4. Post your TPACK Venn Diagrams to this discussion and share any successes, AHAs, or challenges/problems you are experiencing with this topic.

Part 2: Learning from Each Other (Due Monday, April 20 at 10am)

1. Read your classmates' posts and try to learn something new you learn or if you notice a challenge you can help solve, give it shot! Take notes as you read. Share a post of new community learning or solutions to problems/challenges. Your post should refer to concepts discussed by your classmates and at least three names.

APPENDIX E

Class Handbook Table of Contents

APPENDIX F

Class Handbook Contribution for Social Justice in Education

Overview

As a reminder, one of the goals of this course is to share and demonstrate how technology tools can be used to enhance the learning environment. By completing this course, you will be walking away with tools that you can continue to use as both a learner and a future educator.

I have set up a Class Handbook for us to serve as a place for your readings and as a virtual toolbox. We will all take part in contributing to the EDLT 368 Class Handbook Spring 2020 throughout the semester. As you progress in your field, this will be a good tool for reference! Further, giving students the opportunity to develop this skill of finding and using free and open resources and providing equal access to these resources like we are doing here - this is an act of social justice in education.

Readings and Contributions For Mission 4

Mission 4 focuses on the topic of Social Justice in Education

- Review the resources in the Class Handbook section for the topic of Social Justice in Education.
- Note that there are also optional resources in a page in this module - M4 Optional Videos & Resources. You should read and learn until you feel comfortable conducting your own research on Social Justice in Education.
- Conduct your own research on Social Justice in Education for your interest or your context, consider also adding the term technology. One place to look up this topic is your PLN - Pinterest and Twitter may provide some excellent context and ideas for you. Add at least one resource to the Class Handbook section for the topic of Social Justice in Education.
- Notice that you can use a color and need to add your name, first initial and last name, like we have done before.

Submission Details (Due Wednesday, April 22 at 10am)
- When you have completed this activity set, please type in the submission box below "*I have contributed to The Social Justice in Education section of the handbook.*"

Transitioning to Online Music Teacher Education:
Challenges and Opportunities for Knowledge Development

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The context of this article is a non-compulsory pre-service teacher education program, fully incorporated within a five-year Bachelor of Arts Music degree in Athens, Greece. On March 11th 2020, when schools closed, the majority of our forty-three students on the program had completed less than half of the requirements of the thirty-hour teaching placement. A series of steps ensued that included mapping students' progress to-date, strengthening our collaboration with our team of teacher-mentors that continued to teach online, finding online alternatives for observing teaching, creating new teaching material to encourage students to re-imagine music teaching and learning online and, inevitably, shifting assessment requirements to accommodate the novel circumstances. While still at the beginning of our journey, this online transition for the teaching placement has presented both opportunities and challenges for developing new and desired forms of teacher knowledge.

Keywords: pre-service teacher education, teaching placement, technological content knowledge (TCK), technological pedagogical and content knowledge (TPACK), online education

INTRODUCTION

Preparing students for school music teaching is a complex process; one with no clear recipe for success. In the Music Studies Department of the University of Athens, 8 modules are mandatory throughout the 5-year course to acquire teaching accreditation at primary and secondary levels. Part of that is a placement module made up of two terms (October-June) that include theoretical lectures and practical workshops at the university and 30 placement hours (at a minimum) in local schools, of which 27 involve observing teacher-mentors' teaching at various grade levels and 3 focus on preparing and teaching a 40-minute lesson in a classroom setting. Following the nationwide obligatory quarantine that began on March 23rd 2020, it was decided to complete the term (and the teaching placement) online, necessitating the development of new forms of pre-service teacher knowledge and skills through current and future iterations of our module.

Grounded in international literature regarding the preparation of future teachers and particularly music teachers, our course places emphasis on developing reflective practitioners (Triantafyllaki & Chrysostomou, 2012). The quality of teaching in schools is directly linked to the quality of preservice preparation that teachers receive, so developing skills for reflection in action as well as knowledge and skills for effectiveness in the classroom, are part of every music teacher education course. At the same time, it is important for teachers to develop a clear understanding of the realities of teaching life, given the unique features and challenges of a music classroom (Ballantyne, 2006, 2007; Bennett & Stanberg, 2006; Bondy, Schmitz & Johnson, 1993; Chrysostomou, 1997; Darling-Hammond, 2000, 2003; Schön, 1983; Triantafyllaki, 2009; Triantafyllaki & Chrysostomou, 2012).

How would it then be possible to substitute students' teaching placement under these extreme circumstances? What opportunities arise for the development of new types of knowledge and skills? How could these extreme 'realities of teaching life' become an opportunity for change and development of our music teacher preparation course?

INNOVATION

Constant debate on the concerns and issues raised have initiated the following five steps that would allow for a flexible model for the completion of the placement and provide us with a range of empirical data that would inform course development in the near future to encourage the development of new forms of knowledge:

1. An online 'needs analysis' questionnaire, mapping our 43 students' progress before schools closed, along with demographic information, was administered, to provide an estimation of the necessary level of flexibility for the online version of the placement. After initial analysis was conducted, a set of guidelines toward placement completion were presented in our first online session with students.

2. Classroom observations have been substituted with observation of synchronous classroom teaching or of online teaching videos. Regarding the latter, video-recordings of instances of quality teaching has been found to enhance knowledge-building in pre-service teachers' knowledge in other subject areas (Llinares & Valls, 2009). Offering a range of possibilities to observe teaching, asynchronous and synchronous, would ensure our students have the flexibility to experience different teaching environments and styles.

3. Micro-teaching has been substituted with an online teaching plan and the creation of original material (e.g. video-tutorials, edu-games, interactive presentations, a.o.) for use in asynchronous classrooms. Where possible, students could collaborate with teacher-mentors and co-present synchronous micro-teaching. Developing knowledge of creating digital materials and tools was supported through: a) weekly presentations from classroom teachers currently designing and administering such materials, b) re-visiting Open Education Resources (OER) in the subject area, such as the Photodentro aggregator (www.photodentro.edu.gr) and the Aisope digital teaching scenarios repository (http://aesop.iep.edu.gr/), c) encouraging collaborative online discussion during our weekly synchronous sessions with students by administering tasks and using break-out rooms for small-group activity and d) encouraging students to present their own digital materials, reflecting and discussing them with their peers, mentors and invited teachers.

4. To enable reflection and deep learning students are encouraged to include in their portfolio assignments their understandings, ideas and issues related to synchronous and asynchronous teaching. Each hour of observation (whether video-recorded microteaching or synchronous online teaching) is documented in an observation template (see Appendix for its key themes). Students are further encouraged to reflect (using a reflective journal) on how these themes (e.g. teaching strategies) might be adjusted online, thereby promoting reflection on shifts in traditional pedagogies in technology-infused teaching and learning environments (Rowe, Triantafyllaki, & Pachet, 2017).

5. Weekly recorded university sessions on different aspects of the effective use of technology and the tools to support online music teaching are held (see step #3). These sessions were recorded and constituted initial data for the empirical part of our work. They were used to reflect on the opportunities and challenges that creating and delivering music content online presented (O'Byrne, Roberts, Labonte, & Graham, 2014/2015; Lively, 2016). We observed these immediately after the session, through a process of stimulated recall-type discussion (Lyle, 2002), to assess our students' thought processes on technological content knowledge (TCK) and its application in synchronous and asynchronous teaching.

RESULTS

Transitioning from face-to-face to online environments has emphasized the need for flexible pedagogical models and learning outcomes in our teacher education program. The 5-step process allowed us to implement a qualitative approach to research inquiry that places emphasis on preservice teachers' interpretations of their new experiences and the meanings they bring to them (Denzin & Lincoln, 1994). The range of qualitative data that is being recorded and collected includes: (a) Recorded weekly sessions with students, (b) email correspondence with individual students as they create their own online content and lesson plans, and (c) student portfolios submitted in June, including student observation templates and reflections, their self-evaluation of their microteaching as well as the creation of new digital materials and tools.

Initial reflections of the authors on the weekly online sessions, employing stimulated recall technique, has foregrounded a series of questions (Table 1) regarding the urgency to develop students' technological content knowledge

(TCK), technological pedagogical knowledge (TPK), as well as new ways of thinking about mentoring and student support. Taking into consideration the literature on technological pedagogical and content knowledge (TPACK) (Bauer, 2012; Bauer & Dammers, 2016; Dorfmann, 2015) we reflected on how this type of knowledge and skills might be acquired and the modes of support necessary for its development.

Table 1

New understandings arising from authors' stimulated recall reflections

Technological content knowledge (TCK)	● *What do technology-infused musical content and materials look like and how can we develop students' critical capacity to evaluate its value for music learning?*
	● *How can students develop new understandings of musical concepts and knowledge through their creative engagement with such technology-infused content?*
Technological pedagogical knowledge (TPK)	● *What types of pedagogical skills/know-how would (or wouldn't) be developed by substituting classroom with online observation and teaching? (e.g. classroom organization/management, initiating/evaluating music collaborative activities)*
	● *How might students move from thinking about, for example, a music app in terms of 'what can I do with this?' to 'how can I use this to produce an intended learning outcome or address a curriculum objective at various grade levels?'*
Experiences of mentoring	● *What might new forms of teacher-mentorship look like in online environments and could a new range of tools (e.g. asynchronous email conversations) assist in this process?*

In our case, the online transition did not point to a lack of pre-service teachers' content knowledge, pedagogical content knowledge (Shulman, 1986) or even technological knowledge. Rather it uncovered the need for greater emphasis on pre-service teachers' technological content knowledge (TCK) and technological pedagogical knowledge (TPK) (see also Bauer & Dammers, 2016). Additionally, the new teacher preparation reality shed light on the experience of mentoring and of being mentored during online placements, including the rewards and challenges of this relationship during our students' online 'field' experiences (Roulston, Legette, & Trotman Womack, 2005; Chrysostomou & Triantafyllaki, 2020).

IMPLICATIONS

As this term nears completion, it is clear to us that this new 'reality of teaching life' has opened up opportunities for the development of the TPACK domains that include technology (Bauer & Dammers, 2016). While there are ample curriculum opportunities for developing their technological knowledge (TK), scarcely are our students called upon to create technology-infused musical content for classroom use (technological content knowledge); even less frequently do they consider its pedagogical application (technological pedagogical knowledge) in synchronous and asynchronous learning environments. The TPACK model (Bauer, 2012) provides an organizing framework through which our students are invited to create new teaching and learning materials, reflect and self-evaluate these in both synchronous and asynchronous settings.

Teacher educators seeking to develop these types of knowledge could consider a scenario-based learning approach (Hursen & Fasli, 2017; Santoro & Allard, 2008). For example, one such scenario, based on our initial results in Table 1 in developing preservice teachers' technological pedagogical knowledge (TPK), might ask "what form and content should a padlet, aiming to enhance pupils' creative music knowledge (e.g. improvisation skills) at the primary level, have?" Additionally, student teachers' technological content knowledge (TCK) could be enhanced by reflecting on the new understandings of what music improvisation within this technologically-infused content (padlet) entails.

The road to achieving these types of knowledge and skills should be diverse, the course structure flexible enough to allow multiple ways forward. We envision a teacher education program as a structure of different color-coded 'bricks', with each institution building their own 'construction', allowing students to customize their teaching practice experience and build their own teacher accreditation model. Imagine a lego-structure that can comprise blocks of different sizes or colors, yet still have a similar overall shape. For example, 'how many red blocks would equal a green one?', where a red

block may be a 15-minute online video of a teacher presenting a music concept to their classroom and a green block is a synchronous classroom observation of a music lesson of the same age/level and concept. In our 5-step process, steps #2, 3 and 4 provided our students with various options (e.g. traditional/technology-infused pedagogy, synchronous/asynchronous, classroom/video-recorded observation) that allowed for a flexible completion of the placement, developed new types of knowledge and enhanced their reflection. The aim is not to equate dissimilar things but rather to explore the opportunities for knowledge growth and skills development offered by technologies and tools that have now become part and parcel of our online program delivery.

FUTURE RESEARCH

Discussions and reflection within our team of university lecturers and mentor-school teachers are rife, with various outcomes arising, including a webinar invitation from NYU to discuss transitioning online in HE (Chrysostomou, 2020). The difficulties that in-service music teachers had to overcome in order to adapt to online teaching has presented an opportunity for our students and future music teachers. It was a confrontation with the realities and responsibilities of being a classroom music teacher and an opportunity to 'ease' into facing the inevitable 'praxis shock' (Kelchtemans & Ballet, 2002; Mark, 1998). Further research could investigate these particular students' beliefs and attitudes regarding their experience, their perceptions of their abilities and response to unforeseen circumstances as well as their needs and recommendations for future professional development. It will be interesting to ascertain, through further reflection and research, what has been gained and lost under these circumstances.

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APPENDIX

Observation Template. Themes for focusing preservice teachers' observations

1. Direction of teaching practice and examples whereabouts in the lesson this was evidenced

2. Direction of teaching activities and examples of teaching activities

3. Types of musical activities (listening, performing, creating)

4. Forms of questions employed during teaching and examples

5. The how and why of using specific teaching materials/tools during the lesson

6. Teaching strategies used

7. Verbal and non-verbal communication observed and examples of such

8. Pupil responses to teaching strategies used

9. Particular positive aspects of the lesson

10. Aspects that could be improved

Reimagining Learning in a Language Education Course Thrust Online: Social Constructivism in Times of Social Isolation

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A campus-based initial teacher education module in nine units was quickly redesigned within the existing syllabus to run online following the Swedish Government's recommendation on 17 March 2020 to move university teaching online. We used a flipped approach: asynchronous preparatory activity (set reading with study questions, pre-recorded lectures and other podcasts or videos) was followed up by non-mandatory online synchronous workshops and mandatory written unit tasks to be completed individually or in a group, and handed in individually. The unit tasks were designed as active learning, and entailed the application of knowledge and understanding gained in the preparatory activities, deepening the learning of each individual with co-constructed insights. This flipped pedagogy was complemented by collaborative active learning activities for the students who participated in the workshops. The workshop participants were encouraged to complete their hand-in work together during the workshop, collaboratively building understanding. Thus, a social constructivist view of learning was modelled and implemented.

Keywords: Social constructivism, preservice teacher education, online teaching, flipped learning, active learning, English language education, engagement tasks, course design

INTRODUCTION

The teaching context is preservice teacher education in a module focused on teaching English as a foreign language in Swedish secondary schools. There are around 75-80 students who come to us after almost two semesters of studying English language, literature and linguistics. Before COVID-19, this course was to be the object of an innovation project, implementing problem-based learning in a newly installed active learning classroom (ALC) where students would discuss authentic English teaching dilemmas. As part of the move to the ALC, lecture content was pre-recorded in 15-20-minute video lectures, with an introduction showing the instructor followed by a narrated PowerPoint. The idea was to implement flipped pedagogy (Bergmann & Sams, 2014; Cunningham, 2016), offering non-transient lecture content as well as guided reading (using study questions) of the course literature before seminars, leaving seminar time for discussion and student activity.

INNOVATION

The traditional lecture followed by seminar format as well as the planned ALC-format required students to be in stable groups for timetabling and room-booking purposes. Moving online we were freed of these constraints and moved to whole group teaching in Zoom with breakout rooms for collaborative work. We were not able to mandate participation in the workshops, but we implemented a written hand-in Unit task for each unit to oblige students to engage with the course material. In this way we wanted to retain active learning to force student engagement, as suggested by Deslauriers, McCarty, Miller, Callaghan, and Kestin (2019).

Each of the nine units offered input in the form of reading and short pre-recorded lectures, and collaborative processing of the material in breakout groups. Less reading than previously was made compulsory, acknowledging that students may not have had optimal study conditions, however, additional reading was provided for those interested in learning more about each of the unit topics. Pre-recorded lectures have previously been found useful as they are non-transient and can be paused and revisited several times (Cunningham, 2016). Here such lectures were intended to be used before or after the reading as well as while working on the unit tasks and the assessment tasks.

Unit tasks were obligatory but unassessed, to be done during workshops in the arbitrarily assigned groups, or in another collaborative group of the students' own choice elsewhere, or independently. They were intended to require the students to apply knowledge gained in their reading, the lecture or otherwise, moving along Bloom's revised taxonomy (Anderson & Krathwohl, 2001).

We wanted to seize the opportunity, what Salmon (2020, April 28) calls a pivot to quality online provision, provided by Covid-19 to bring best practice in online learning and teaching to our course rather than simply holding our seminars in Zoom as "emergency remote teaching" (Hodges, Moore, Lockee, Trust & Bond, 2020; Salmon, 2020). The problem-based teaching and active-learning design we had planned for our ALC was re-imagined, using Zoom workshops with breakout rooms to replace and perhaps exceed (Vonderwell & Turner, 2005) the affordances of the ALC in a synchronous element. Nine obligatory hand-in unit tasks forced student-active engagement with the material, what Vonderwell and Turner (2005) term "learner engagement and involvement with the instructional content and learning processes such as thinking, questioning, reflection, metacognition, collaborative, and cooperative activities" (p. 67). Mindful of the difficulty some students may have been experiencing in their study arrangements, we wanted to allow independent work, but encourage collaborative completion of the unit tasks during the workshops. Table 1 shows how the course morphed to incorporate active learning and then to move online.

Table 1

English language education course as offered in Autumn 2019 (Traditional campus), as planned for Spring 2020 (Planned campus), and as actually taught Spring 2020 (Re-imagined online).

	A. **Traditional campus**	B. **Planned campus**	C. **Re-imagined online**
Venue	Lecture hall and seminar room in three groups	ALC in three groups. Six students sit round each of four technology-rich tables.	Zoom workshops in one group with breakout rooms
Course literature	Two course books and additional articles; study questions to guide reading	Two course books and additional articles	One main course book and additional articles, with reading from the second course book recommended but not obligatory; study questions to guide reading
Lectures	Nine 90-minute lectures in whole group in lecture hall	Two live 90-minute lectures in whole group in lecture hall; others pre-recorded (12-20 mins)	Two live 90-minute lectures in whole group in Zoom; others pre-recorded (12-20 mins)
Classes (all with non-mandatory attendance)	Lecture and seminar for each unit	Some lectures in lecture halls and problem-based workshops in the ALC.	Zoom in whole group with breakout room activity to first discuss the study questions, and second work on the unit tasks.

	A. **Traditional campus**	B. **Planned campus**	C. **Re-imagined online**
Examination	1. Justified lesson plan task with student-recorded microteaching and peer review 2. Course paper on one of three topics 3. Oral presentation on paper topic		1. Justified lesson plan task with peer review 2. Take-home exam with three of eight questions 3. Oral presentation on an authentic teacher problem 4. Nine non-assessed unit tasks

The design of the course was informed by theories of social constructivism including key principles that knowledge is constructed by learners, that knowledge is experience-based, and that learning is social (Beck & Kosnik, 2006). Moving online, workshops replaced ALC seminars. Students in breakout rooms first worked together with the study questions, while teachers supported them. After a break, students returned to the same breakout rooms to complete the unit tasks during the last 45 minutes of the workshops. There was no requirement to attend workshops, or to work in groups, but the unit tasks were to be submitted by each student at the latest by the end of the course. There was a recommendation, but no requirement to have prepared before the workshop. Breakout groups of six to eight students were created arbitrarily by Zoom for each workshop. Our hope was that hearing the discussion in the group would serve as some input even for those who had not read and listened ahead of time, and that there may be social pressure from peers to prepare better next time.

RESULTS

Using Zoom's polling function, anonymous student input was secured. Figure 1 shows that half or more of the 30 students who responded to a poll in the fourth workshop agreed with the statements that "breakout rooms are good" and offered "good discussions that help me understand", while there were indications that some students were not well prepared for the workshops.
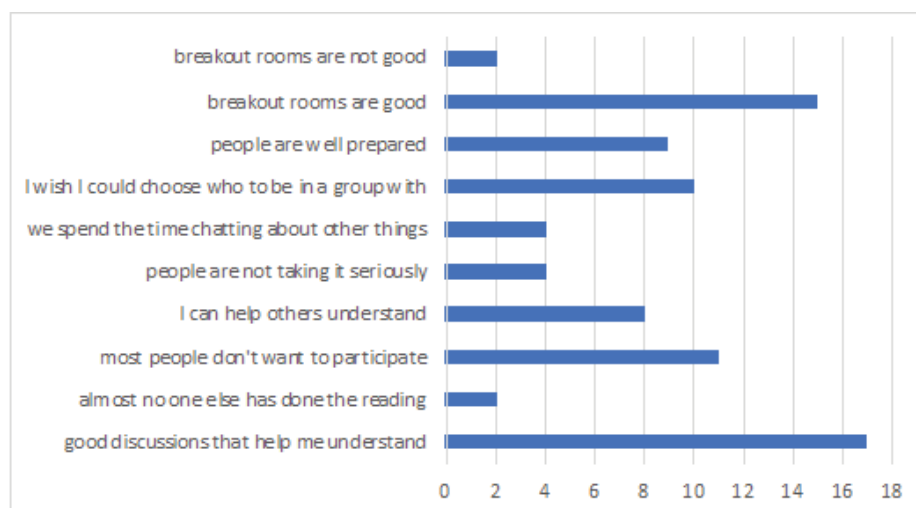
Figure 1. Poll on breakout rooms in workshop 4.

Figure 2 shows the results of a poll about the pre-recorded lectures. Most of the 29 responding students agreed with the statement "I find them helpful", but not all students watched the lectures through. Many students also reported using the lectures intensively, watching them through, rewinding and pausing and taking notes.
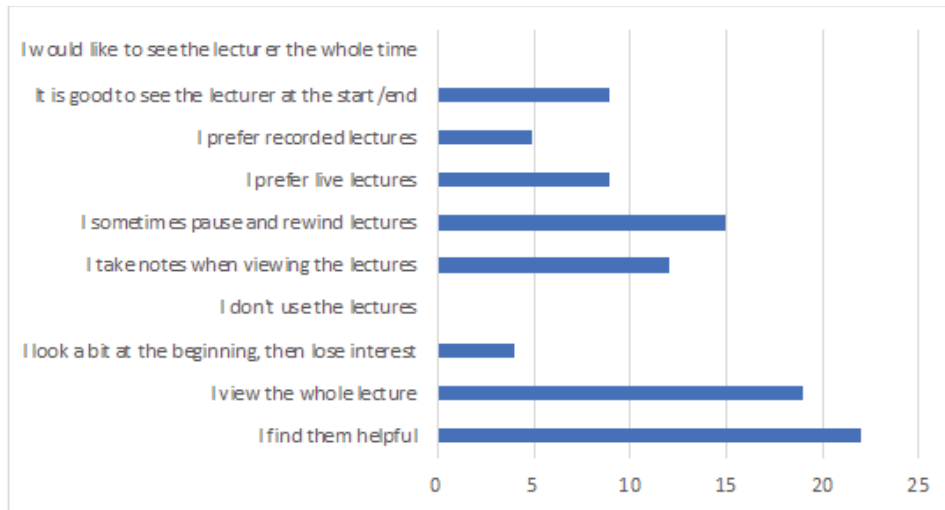
Figure 2. Poll on lectures in Workshop 5.

The workshop attendance dwindled as the course progressed, leaving the students who were keen to work together on the unit tasks. Figure 3 shows the decline from 71 at Workshop 1 on 4 May to 36 at Workshop 9 on 20 May. The last two workshops had yet to occur at the time of writing.
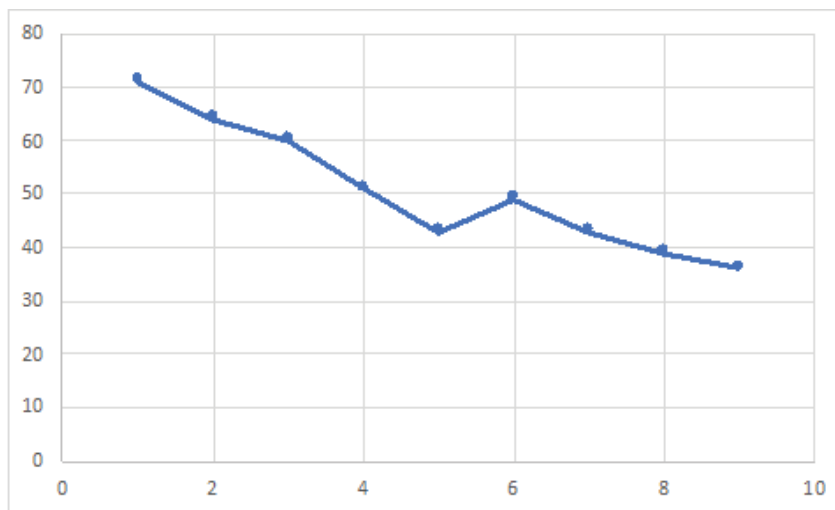
Figure 3. Workshop attendance.

The results of the polls do not represent the views of the students who did not attend workshops. These non-attendees represented both those who preferred to work independently, and those who were not on top of their studies. The former group were likely to find the current course design, with all material available in advance for each unit worked well for them, giving them control of their studies. These independent learners could work ahead if they chose, though we decided to have just two units beyond the current unit open, so as not to overwhelm other groups of students. The non-attendees who were not on top of their studies included disengaged students and procrastinators as well as those whose personal circumstances during the Corona restrictions were not conducive to study success. This group was disadvantaged by the lack of campus teaching, and by the lack of an attendance requirement for the course.

Students who chose to attend workshops also belonged to several groups. Those who were well prepared were the drivers of the breakout discussions and thrived in this social constructivist design. The less well-prepared attendees may have hoped to glide through in group completion of unit tasks without really engaging with the material, but at least heard others discussing concepts, and should also have been be winners in this model. The nine obligatory unit tasks were expected to be useful for well-prepared workshop attendees to guide their learning, and should have ensured that

the independently working students engaged with the course material and came further in their understanding of the concepts than they would have by reading and viewing alone. By the mid-point of the course, when the first major assignment was due, just half of the students were up to date with the unit tasks. Others may have been overwhelmed by the number of tasks they needed to complete, falling behind even though the unit tasks were direct preparation for the end-of-course take-home exam. These students were not able to take advantage of the collaborative work in the workshops, designed to get the unit tasks completed during the workshops. Again, this group was disadvantaged by attendance not being mandatory.

IMPLICATIONS

1. Workshop attendance is important

The declining attendance shown in Figure 3 was not a result of our move online, but was also observed in previous iterations of the course. Dolnicar (2005) explains this as a trend towards attendance pragmatism where some students attend classes only to get the information they need to succeed in the subject. For students who did not understand or believe in our social constructivist approach, attending class would have appeared to be pointless since all the information they needed was already available in the learning platform.

We would advise others in our situation to make attendance mandatory if possible. A strategy to get sceptics onboard would be to explain the social constructivist approach as a model for the students' own teaching practice, and to include a unit task requiring students to reflect upon their own learning in collaboration with their peers.

2. Seeing each other helps build social presence

Many of our students were unwilling to turn on their webcams or microphones. Larsen Damsgaard (2020, April 27), writing in Norwegian, tells of teaching a sea of black screens and trying to engage people who are neither seen nor heard. Many of our students were actually there and yet chose to lurk rather than contribute. We made it clear that we would not join the breakout rooms unless invited, and encouraged students to have their cameras on in the breakout to facilitate collaboration. It is well established that social presence, the sense that the other is a real person, is enhanced by the use of audio and video (Cunningham, 2014; Garrison & Anderson, 2003; King & Ellis, 2009; Lipman 2003), and that if a community of inquiry can be established, students can together learn more than each could alone. The use of breakout rooms to afford learners a more intimate environment for interaction than the full-group Zoom where everyone can observe everyone else was important to our social constructivist approach (Creelman, 2020).

Our recommendation is to encourage the use of webcams in breakout rooms to foster a sense of belonging (Peacock, Cowan, Irvine, & Williams, 2020) while tolerating their non-use. A strategy to build social presence despite student reluctance is to encourage the use of webcams when students are working in smaller groups.

3. Students need to be able to find the course material

A third recommendation from our experience stresses the importance of an accessible and clearly structured course (Salmon, n.d.). Figure 4 shows the division of our course into nine units with hand-in assignments clearly placed in the order of events, and Figure 5 shows the details of what a unit on vocabulary contained, with links onwards to the pre-recorded unit lecture, study questions, the unit task, and further reading. Examples of this lecture, the study questions and the unit task are shared online at https://tinyurl.com/y8zr7ogs .

Figure 4. Course structure in nine units.

Figure 5. The structure of a unit on the teaching and learning of vocabulary. The lecture, study questions and unit task are shared at https://tinyurl.com/y8zr7ogs.

Salmon (n.d.) offers a helpful five-stage model for online course design, pointing out the need for accessible information, online socialization, information exchange, knowledge construction and development. Our course followed these strategies, and we had no questions from students about where to find material. We recommend following Salmon's five-stage model to ensure that the course meets the needs of the students.

In conclusion, we recommend a combination of clear structure, non-transient resources, flexibility (Delfino & Persico, 2007), understanding of the students' learning situation and responsiveness regarding technical troubleshooting. A course design informed by social constructivist theory is suitable for many categories of students, as long as they attend workshops. If they do not attend, they are left alone to complete unit tasks and to interpret readings and lectures. We recommend attendance requirements in synchronous elements of online preservice teacher education courses, and also mandatory engagement tasks.

FUTURE RESEARCH

We will continue to monitor course results and the learning analytic data provided by our learning platform, to look at the relationship between student activity and course completion. We will also attempt to relate course evaluation data to our pedagogical choices in this teaching approach. We are keen to apply our insights to new online iterations of this course and to other similar courses at our institution and beyond.

Further research is needed to better understand the learning of students who do not buy in to a social constructive view of learning, but rather prefer to work entirely asynchronously and independently. In addition, the effects on students and teachers of some students choosing not be seen or heard in synchronous video teaching sessions are not yet well understood. It seems likely that a student being invisible will affect teacher-student and student-student relationships. We may need to continue to teach our campus programmes online for some time, and we need to meet the needs of students who have not chosen online study.

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Revisiting Preservice Technology Integration Course Content: What are the Critical Objectives?

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Technology integration classes are constantly changing. At both the University of Oklahoma and Indiana University, placing this undergraduate course online for the pandemic exposed considerable redundancy. This conversion allowed us to streamline content, model effective online practices, engage students in developing remote learning skills and focus on course objectives to ensure that each activity was aligned with our goal to create effective technology using teachers.

Keywords: preservice, technology integration, course design, online teaching, course objectives, instructional design, ISTE standards

INTRODUCTION

Educational technology courses are constantly changing. The International Society of Technology in Education (ISTE) updates their technology standards for educators every few years to keep current (Trust, 2018). This must be balanced with making the technology coursework meaningful to a variety of content areas and grade levels (Hur, Cullen, & Brush, 2010; Ottenbreit-Leftwich, Glazewski, & Newby, 2010). Chung and Yeh (2020) found that these types of courses covered a wide range of topics including online learning, computing education, STEM, social media, digital divide, digital citizenship, cybersecurity, OER, big data, and virtual reality. **We are attempting to cover too much content**. We need to focus on our true goal: to prepare future teachers to use technology effectively. The COVID-19 pandemic helped us focus on this goal and be responsive to the realities of a changing role of educators and technology.

INNOVATION

We both coordinate face-to-face introductory educational technology courses for preservice teachers. The pandemic offered us an opportunity to identify and refocus on critical content, while ensuring it was responsive to their current realities and how remote K-12 learning may be a part of their future careers. We acknowledge the challenge of continuously adding new technologies to a crowded syllabus. We both use the ISTE Educator standards framework; however, it is challenging to address all of these standards in one course. There is a delicate balance between covering versus encouraging students to deeply consider a topic, especially when students will teach different grade levels and disciplines. Because everything moved online quickly, we needed to reduce content to not overwhelm students. Therefore, we revisited our main course goal (i.e., making informed technology integration decisions for teaching/learning) and assessed which activities were necessary to achieve this goal.

At Indiana University, we examined the remainder of Spring 2020 course expectations with the goal as our focus. We were still scheduled to cover Twitter chats, professionalism, big data, growth mindset, and digital citizenship. Instead, we streamlined course content using relevant examples around COVID-19, like discussing ideas around big data related to contact tracing or identifying fake news stories (see Figure 1, Figure 2, Figure 3).

#	Lesson Part/Activity type	Description	Material/resource	Time of the class	Interaction S: Student Ss: Students AI: Instructor C: Content
3	Analyze, discuss and share	**Personal Data vs Stop COVID 19** AI talks about Korean experience of using COVID -19 tracking app. (AI reads the article and watches the video before the class to get ready) And the possibility of the US using the same/similar methods of tracking people. (AI reads the article before the class to get ready) **Zoom Poll** AI creates Zoom Poll, asking: Is it ethical to use citizens' personal data to stop COVID- 19? **Breakout rooms discussion** After the poll, Ss discuss their answers in smaller teams in breakout rooms. (3-4 Ss in a room, everyone needs to have chance to speak, so that's why at least 10 minutes time for this activity. **Reflection** The entire class reflection.	PPT slides 12-16	5 min 5 min 10 min 4 min	S-C S-Ss S-I AI-Ss
		Comments: This is the main part of the lesson. For AIs, here is the video on how to use Zoom Poll in case if needed: **Link**			
4	Model Activity	**Data Visualization for Literacy: Link** This is a good example how Data Literacy can be taught. AIs go over the page and demonstrate how it works. **Model Activity - Big Data Sleuth Card** This is an activity from Big Data lesson from Code.org. AI goes over the lesson, shares it with the Ss. This is a model activity it shows how Big Data can be taught for K-12 Ss. If time allows AI can try the Model Activity with Ss.	PPT slides 17-18 Hand out: bit.ly/BigDataSpring2020 Lesson source: https://curriculum.code.org/csp-1718/unit4/1/	10 min	S-Ss Ss-C Ss-AI
		Comments: If time allows this is a good demo activity to try. Will need to break students into groups (break out rooms) and share with them the handout: bit.ly/BigDataSpring2020. They will follow the instructions there. This activity is a part of a Big Data lesson by Code.org.			

Figure 1. Part of lesson plan for big data and COVID-19 relevant examples.
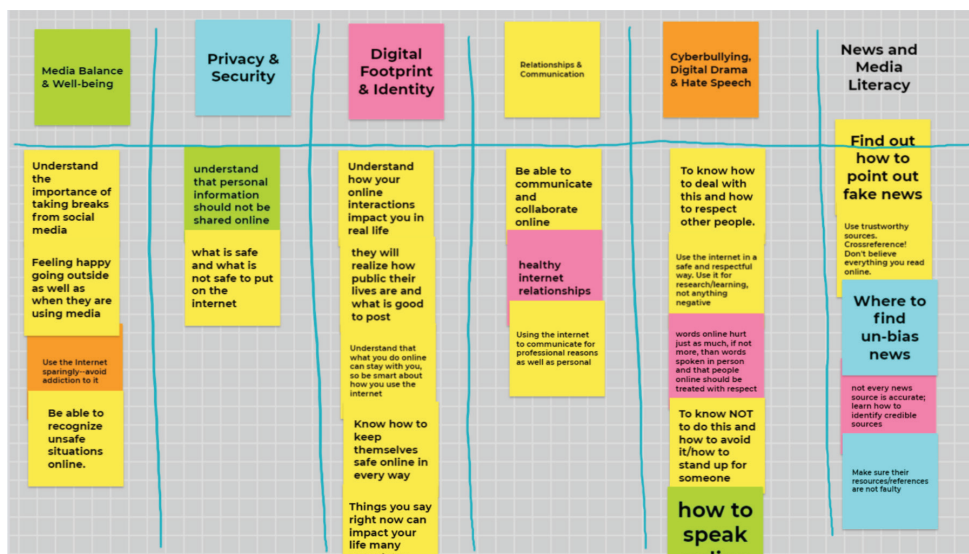
Figure 2. Example of Activities Jamboard used to Facilitate Online Digital Literacy.

458
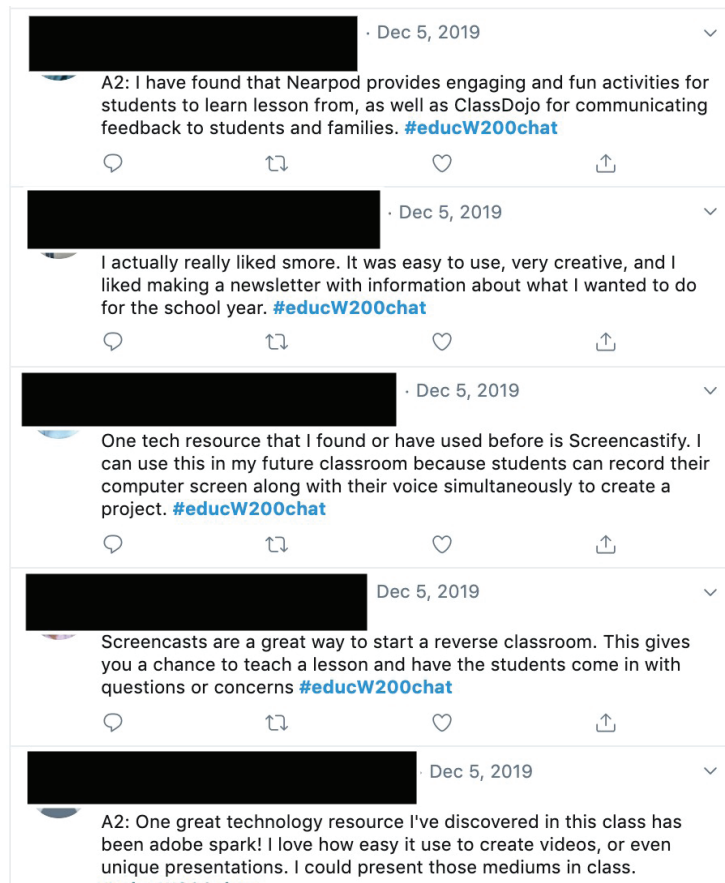
Figure 3. Example of Twitter Chat on Online Learning Tools.

In addition, we decided to eliminate two large projects and instead had the preservice teachers design and develop an online technology resource for an actual teacher engaged in K-12 remote learning. We shared two of these examples below: one preservice teacher created a Wakelet on how to write a lab report for her former Chemistry teacher (https://bit.ly/ChemExampleWakelet) and another elementary preservice teacher created a Gimkit for a relative who was 2nd grade teacher on parts of a sentence (https://bit.ly/EleExampleGimkit) (see Figure 4). Teachers used the materials during remote learning and emailed the preservice teachers to let them know it was beneficial to their students' learning.
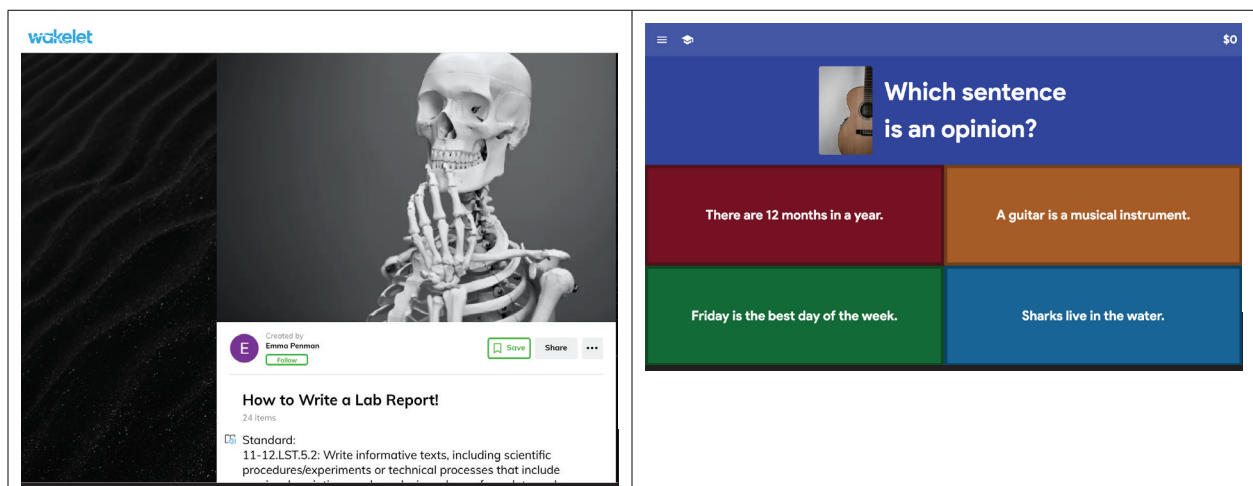
Figure 4. Examples of preservice teachers' created online resources.

The University of Oklahoma also approached their remaining activities focused on coding with their main goal in mind. We teach coding using four different approaches: code.org, Swift Playground, Sphero robots, and Thunkable app development. Before social distancing, students explored code.org but needed to explore larger ideas in the Computer Science Education Standards (CSTA, 2017). After moving online, we decided to focus on the design aspects of computer science. Students designed wireframes for apps, discussing both form and function using knowledge from code.org tutorials. This change helped them to be prepared to meet standards with conceptual ideas when technology might not be available and discuss the equity issues that came with inequitable technology access during COVID-19. Many students had not attended local professional development workshops before we went virtual, so we were able to have them attend national workshops and conferences online. More students learned with inservice teachers and learned technologies beyond those we could cover in the course.
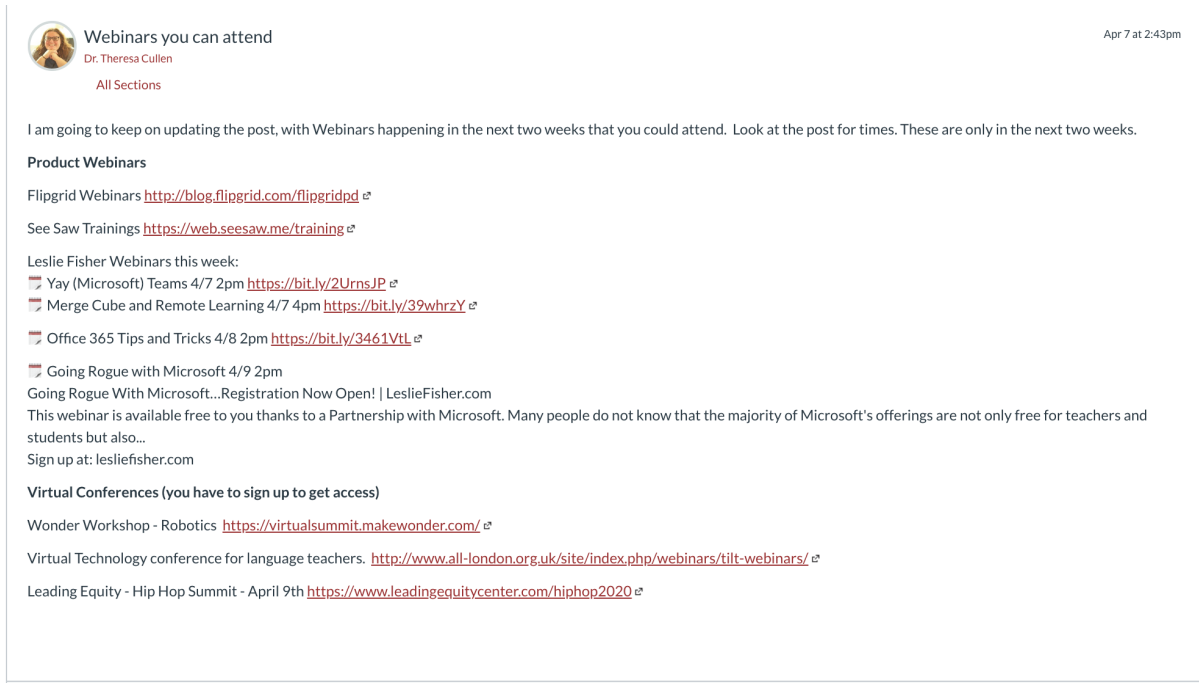
Figure 5. Some of the professional development activities that students pursued.

Table 1 illustrates what activities we removed from our course due to COVID-19, showing we still were able to cover all the important ISTE standards.

Table 1

ISTE Standards for Educators	University of Oklahoma	Indiana University
Learner	Twitter, PLN, Apple Teacher, ~~badges.~~ Professional Development workshops (*national options added*)	~~PLN,~~ Google certification, ~~ePortfolio goals,~~ Twitter chats
Leader	Copyright, Parent communication, ~~influence infographic~~, technology appropriate debate.	Twitter chats, ~~Field experiences, ePortfolio technology pedagogical statement~~, *Discussions on equity related to remote learning (added)*
Citizen	Digital footprint, Readings, ~~3~~ 2 weeks of digital equity	~~PLN, Digital Citizenship technology resource creation, Information literacy breakout box~~, Discussion on big data, *Remote learning technology resources for teachers (added)*

ISTE Standards for Educators	University of Oklahoma	Indiana University
Collaborator	OER, iPad as whiteboard, quizzing apps, global ~~reading~~ *collaboration (added)*, *building community remotely (added)*	~~Collaborative in-class activities~~, ~~Breakout boxes~~, ~~In-class discussions, station activities~~, *Breakout room discussions (added)*, *Using online collaborative tools (e.g., Jamboard, Whiteboards, etc.)(added)*
Designer	~~Creativity Project~~, Epub creation, Green Screen and movie making, ~~AR/VR~~, *App Design (added)*	~~Field experiences, CT/CS technology resources, Digital Citizenship technology resources~~, *Remote learning technology resources for teachers (added)*
Facilitator	iPad as whiteboard, lesson planning, *remote lesson planning (added)*, UDL	~~CT/CS technology resources~~, Professional growth and development goals, *Remote learning technology resources for teachers (added)*
Analyst	~~robotics~~, code.org, ~~swift playground, thunkable~~, influence video	Discussions around tools for formative/summative assessment, ~~Field experience reflections on student learning~~

RESULTS

At Indiana, students were more engaged in class discussions relevant to their future careers and daily lives. Students indicated that creating materials for teachers helped them understand what teachers were struggling with and forced them to consider how to teach online: "I think it is great to work with teachers! It gives some real experience that is helpful" and "by creating this tool for the teacher, I was able to lighten his load as a teacher…I will be able to say I am prepared to teach if another disaster like what is going on now happens again." In addition to their positive reflections, these changes improved student attendance and participation, especially for those students reluctant to speak out during face-to-face classes.

At Oklahoma we met global standards by connecting with teachers from Canada, Italy, Columbia and South Africa to share how they were meeting student needs during COVID-19. Both students in the technology class and displaced interns participated. Students and presenters used Google Docs to create and answer collaborative questions and foster reflection on their role as a global citizen (See Doc here https://bit.ly/cv19global) The activity modeled how multiple technology tools can be layered to achieve student learning outcomes remotely. We also asked preservice teachers to make additions to their traditional technology lesson plan assignment, requiring preservice teachers convert their lesson to remote learning.

These examples illustrate how we revisited our main goal for the courses, eliminated, and modified content so students could think more deeply and participate in deeper, relevant learning experiences with more time for reflection and space to provide meaningful feedback to each other while processing the challenges of teaching and learning during COVID-19. At the University of Oklahoma and Indiana University, we both cut our meeting times in half, reserving class times for focused interactions, personal connections and reflection. We expect these changes to improve learner experiences in the future, regardless of whether we are face-to-face or online.

Implications

We learned three important things that may help other teacher technology educators adapt their courses. First, make sure to adapt to the changes in education in a visible way to model for students and demonstrate flexibility. Second, make sure to provide diverse technology experiences so that students are well equipped as classroom teachers for remote teaching. Third, look for opportunities to connect students in service learning opportunities during remote teaching to allow them to see how technology is applied and foster the development of their own technology beliefs and practices. Finally, throughout all of these processes, review curriculum to make sure that explicit reflection is built into the course. As major changes happen in education, future teachers need support and time to process and apply their skills to these new situations.

This situation provided an excellent opportunity to model effective online pedagogy which is a criticism of technology integration courses during the time of COVID-19 (Koenig, 2020). We felt compelled to showcase how teachers can facilitate online discussions, incorporate interactive elements, and provide effective instructions to guide synchronous and asynchronous learning and this will be a greater emphasis in the course moving forward to prepare teachers for remote teaching. Rahm Emanual (2008) stated, "You never want a serious crisis to go to waste. And what I mean by that is an opportunity to do things that you think you could not do before.". As teacher educators, we have a responsibility to act on teachable moments and be flexible to change our content to best prepare our students for successful careers.

The teacher education technology course can encourage future teachers to be more flexible and this flexibility has been shown to improve their ability to apply technology in classroom situations (Garner & Bonds-Raacke, 2013). In 2016, the US Department of Education, stressed in a National Educational Technology Supplement "we need to work to ensure that every new teacher is prepared to select and use the most appropriate tools to support transformative teaching and learning" (Stokes-Beverley & Simoy, 2016, p.5). As the requirements and expectations of the teaching profession transforms during this pandemic, we as teacher educators have a responsibility to both model and help students to develop the skills needed to succeed in a classroom that may incorporate remote or blended learning (Koenig, 2020). Given the ever-changing CDC guidelines (CDC, 2020), these kinds of changes can also include issues of equity related to technology access and care and disinfection of devices. By incorporating these topics both in response to COVID-19 and issues that the pandemic made visible (access and equity), we are providing our preservice teachers with added flexibility to adjust to the changes that will continue in education in support of the goals of the current National Educational Technology Plan (Thomas, 2016).

Consider taking the crisis as an opportunity to engage preservice teachers in service learning. At Indiana, we shifted field experiences to support K-12 teachers as they created remote learning materials. We had previously implemented this kind of service learning (Jia, Jung, & Ottenbreit-Leftwich, 2018) where authentic learning experiences helped to connect technology integration with teaching content. However, in this context, preservice teachers seemed to be more appreciative as they were assisting K-12 teachers with traumatic situations, while learning about how to apply their newly gained technology integration knowledge to real world problems. Song (2018) also found service learning had a positive impact on pre-service teachers' technology self-efficacy, beliefs about technology integration in their future classrooms, and how technology can be an asset to K-12 learning.

By streamlining the curriculum, we were able to encourage greater student reflection and deeper understanding. Providing time for reflection can provide students with opportunities to deepen their learning by helping them develop agency, formulate personal beliefs, and can lead to social transformation through the improved practice (Van Beveren, Roets, Buysse, & Rutten, 2018). In a large survey of over 1,200 K-12 teachers, Common Sense (2019) found that approximately one-third of teachers do not use the technology products provided to them by their districts. Mouza (2019) indicated that we need to provide teachers with opportunities to "identify both the technologies they like to use and the ways in which they can be used to support their students' learning" (p. 302). It is critically important that we build these experiences with scaffolded reflection for our preservice teachers. By creating more space and time for preservice teachers to explore technology integration tools and reflect on the usefulness of those tools, we will likely be increasing their likelihood to use these tools in the future (e.g., Banas & York, 2017).

FUTURE RESEARCH

We challenge other preservice teacher technology educators to examine their practices and identify places where they may have incorporated too many tools and activities. The course would be more streamlined, more easily offered in multiple formats, provide greater opportunity for student reflection, and allow them to develop new and different skills to be able to be flexible as education changes. If this task seems daunting, we suggest that revisiting course goals and design activities that specifically support students' showcasing their learning and thinking about classroom technology use. It would also be interesting to study syllabi from preservice teacher education courses from before and after our COVID-19 responses to see how courses have changed, what different skills are emphasized and if these new skills map to the ISTE standards for educators or are showing new needs for preservice teacher technology development.

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Flipping the Classroom with Routine and Innovation

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This chapter discusses experiences with online teaching in pre-service teacher education. During a ten-week course for future primary school teachers of English in February-May 2020 a flipped classroom course design with seminars on campus was suddenly shifted to distance education. Our teacher response to the situation encompassed three main areas: increased flexibility, increased student autonomy, and development of innovative repertoires of formative assessment. Our recommendations include that teachers should look for ways to build on proven physical classroom strategies in the digital environment.

INTRODUCTION

The authors taught different sections of an English for preservice primary school teacher course in the spring of 2020. The course used a flipped classroom design (Akçayır & Akçayır, 2018). Students were asked to do readings, viewings and "mini-tasks" before each seminar. Then, at each of the ten seminars, they collaborated as groups using the tasks they had prepared to discuss lesson planning and develop their project around a children's storybook. The mini-tasks served as means of formative assessment. For example, in the first mini-task students were asked to draw a concept map of the content they had learned in the previous seminar. Having completed their concept map, the students photographed it and uploaded it to a Padlet linked in the LMS. Students were able to see each other's responses and the shared maps also provided useful information for the teachers about what to focus on in the classroom meeting (see Figure 1).
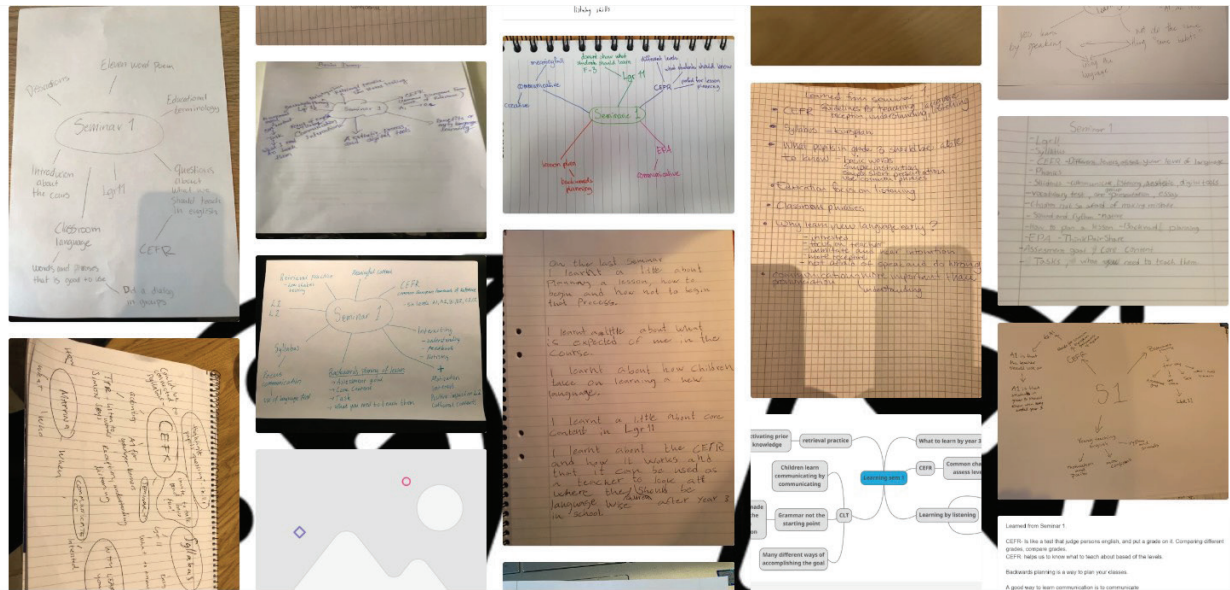
Figure 1. Screenshot from Padlet showing students' answers to a conceptual-map mini-task.

The flipped classroom model has been shown to be effective for English language teaching (Chen Hsieh, Wu, & Marek, 2017) and teacher education (Kurt, 2017); our course included both.

INNOVATION

Our response to the sudden move to distance teaching in the spring of 2020 can be characterized by (1) increased flexibility and (2) increased student autonomy as well as by (3) development of formative assessment strategies adapted to the digital environment.

Increased Flexibility

Increased flexibility is demonstrated in the way that the authors responded differently to the move to online teaching. Two sections moved to synchronous online seminars in Zoom while one section moved to asynchronous tasks supported by threaded discussion on the LMS. Whereas the synchronous seminars unfolded according to the original schedule, the asynchronous seminars were supplemented with a Zoom meeting room continuously open for students to speak with each other, Zoom "office hours" with the teacher, and a whole-class message thread on the LMS. These measures allowed for flexibility of communication channels and for student autonomy in terms of when to interact with fellow students and when to complete the course tasks.

One of the challenges of threaded discussion is that students need some motivation to continue participating in the discussion after they have already posted; it is not a true discussion if people do not engage with each other's posts. The asynchronous teacher encouraged interaction in discussion by providing a group goal, where the students had to compile a shared "final version" of their individual mini-tasks, which was then submitted for teacher feedback (see Figure 2). Finding flexible solutions which allow students to participate asynchronously appeared to be effective.
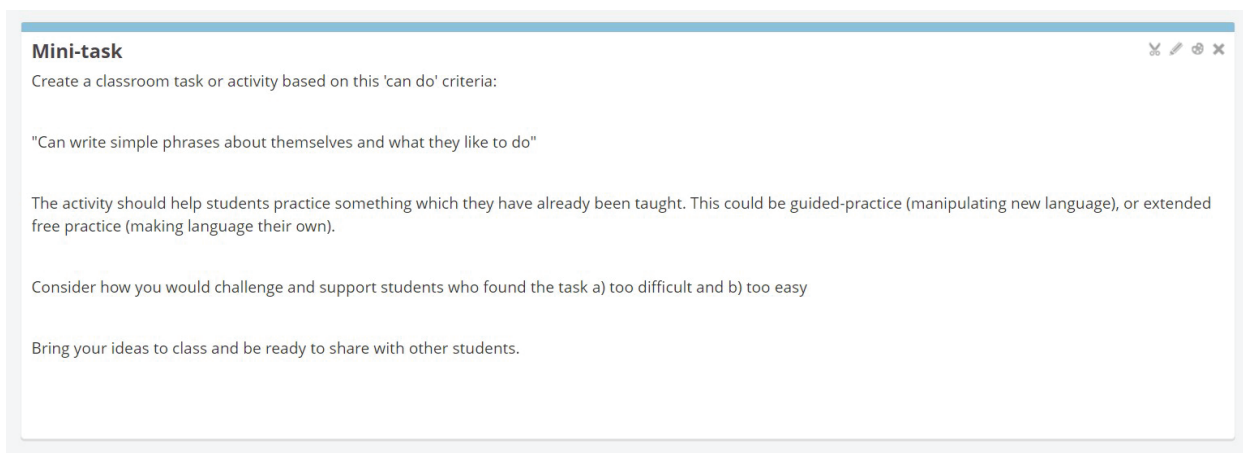
Figure 2a. Screenshot of instructions for a mini-task originally designed for students to complete and bring to an in-person seminar for further discussion.

Figure 2b. Screenshot of instructions about given to students to implement the mini-task instructions in Figure 1a in the online environment. (Athena is the name of our university's LMS.)

Increased Student Autonomy

In addition to increased flexibility we allowed for more student autonomy (Nunan, 2003). For example, the reason one section moved to the asynchronous format was that the teacher called for a vote via online survey and the majority chose the asynchronous format. Further examples of increased student autonomy are given in Appendices A and B (described below).

Formative Assessment Strategies

One consequence of increased student autonomy is that the teacher needs formative assessment strategies suitable for the online environment. One solution to this was to use the polling function on Zoom. Another strategy was "no hands up" during group discussions (Wiliam, 2011), where the teacher calls on a student randomly to answer questions, aided by a randomizing device with student names. A third strategy was active learning during online lectures, where discussion questions and retrieval practice were planned and built into longer presentations (Biggs & Tang, 2011; James

2017). Students would either get to reflect directly in the whole group with the teacher moderating the discussion, or breakout rooms were used. Questions were posed to the class at regular intervals throughout lectures in order to maintain focus, reflect and consolidate new knowledge. We found that presentations and lectures benefitted from elements of student interaction.

Another innovation in formative assessment was our use of the think-pair-share method, widely considered an effective formative assessment strategy for increasing classroom engagement and learning (Barkley, Cross, & Major, 2014; Wiliam, 2011), in the Zoom environment. It was used in attempts to reduce learner anxiety, which can be just as prevalent online, or even more so, than in the physical classroom (Pichette, 2009), and to promote participation. First students were given five minutes to think by themselves about a set of questions. The next ten minutes were spent in breakout rooms where the students would "pair" their ideas in groups of threes or fours. The "share" stage took place in the main Zoom room, where the teacher led a whole-class discussion.

Further examples of two mini-tasks and how they were adapted to the digital environment are given in Appendices A and B. Appendix A describes our adaptation of a mini-task where students learned strategies for teaching vocabulary to English learners. Appendix B describes our adaptation of a mini-task where students learned about providing feedback on learners' writing in English. Both of the adaptations described in Appendices A and B involve increased flexibility and student autonomy and formative assessment strategies adapted for the digital environment.

RESULTS

In the final digital seminar of one of the sections, students evaluated their course work and their learning experiences building a "word cloud" on Mentimeter. The results from this survey are shown in Figure 3.

What did you find a) enjoyable and b) challenging about this course?

Figure 3. Results from formative assessment student survey on Mentimeter about what they found enjoyable and challenging about the course. (Athena is the name of our university's LMS.)

A number of students reported that they found Zoom meetings and/or distance learning challenging. In terms of interaction, the online environment changed student practices. Some students reported in other ways that they felt ham-

pered by the digital distance format whereas we noticed that other students found themselves speaking more than they usually would in the campus-based seminar room. We found no noticeable difference in the quality of student work compared to work from previous campus-based classes and our expectations at the beginning of the course before the shift to online teaching.

IMPLICATIONS

We found that that strategies that were originally developed for the physical classroom, such as think-pair-share, "no hands up", and whole-class discussion around questions worked well in the Zoom environment. Notice that use of some of these strategies requires teachers and learners to be comfortable with long silences during a Zoom meeting. We believe that readers of this chapter should consider using other proven classroom strategies in the online environment. These time-tested strategies can be complemented with features the online environment provides, such as threaded discussion, Zoom breakout rooms, and the polling function in Zoom. Similar findings have been observed in the fields of nursing education (Price, Whitlatch, Maier, Burdi, & Peacock, 2016) and special education teacher education (Smith, Smith, & Boone, 2000); we extend this conclusion to language teacher education as well.

Despite the fact that many common classroom strategies can be imported directly to the distance-teaching environment, we believe that some formative assessment strategies that work in the classroom do not work as well in the online environment. As Swan (2003) points out, "… unique characteristics of the medium may afford and constrain particular kinds of learning […]. Such affordances and constraints, in turn, suggest certain strategies and approaches that might enhance the learning effectiveness of online instruction." (p. 22) In a physical seminar the teacher can move around the classroom and monitor the work of groups of students more or less simultaneously, but in Zoom or autonomous discussions the teacher needs to find other ways to check how student learning is progressing. Sometimes this can be done for student groups, such as when we gave groups of students a task to fulfill and then gave teacher feedback to the results of the task. Sometimes this can be done for individuals. For example, for one asynchronous seminar individual students were required to submit their mini-tasks to the teacher. They then received feedback and had a chance to submit a revised version of the mini-task for more feedback. While giving feedback to groups of students was sometimes effective, we recommend that teachers use more feedback to individual students than they would in a campus-based class. This more individualized approach to formative assessment takes more teacher time to respond to each student's work instead of responding to groups.

We additionally recommend that distance teachers afford increased student autonomy (cf. McBrien, Cheng, & Jones, 2009). This can be done in terms of when to fulfill assignments and also how to fulfill assignments. Students can provide their feedback about whether they would prefer to do synchronous or asynchronous tasks as the course progresses. For asynchronous tasks, the teacher does not need to tell students exactly how to fulfill the assignment. Instead, the teacher can simply provide a number of tools that the students can use (in our case, a threaded discussion forum, an open Zoom meeting, and a Google Drive folder for file sharing) and students can decide how they want to use these tools to meet the goal. This can help students to feel more control over their own learning and also makes it easier for the teacher because he/she does not have to micromanage how the assignments are being completed.

FUTURE RESEARCH

In upcoming terms, we have the ability to plan entire courses to include the distance strategies that we have written about in this paper. We believe that planning to use high-quality, individualized strategies from the start will have even better effect on student learning. When we return to on-campus teaching, we may consider using some of the same strategies we have used in the distance environment.

The students in our classes who experienced the shift to distance learning in the spring of 2020 are not distance-learning students; they are students who signed up to be in a physical classroom. Further research may examine how other classroom-based practices can be adapted to online classrooms in order to increase continuity for students, whilst allowing classroom-based teachers (who have little to no experience in digital pedagogy) to continue to deliver high-quality education. Some classroom practices to be explored could include pose-pause-pounce-bounce (Sida-Nicholls, 2016), no-opt out questioning (Lemov, Hernandez, & Kim, 2016) and think-alouds (Ortlieb & Norris, 2012).

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Crocodile	Reverse	Cat
Teapot	Jousting	Chocolate
Anger	Feedback	Breadcrumbs
Chimney	Triangle	Witch
Passport	Bicycle	Wind
Contemplate	Builder	Army
Agreement	Extreme	Joy
Hippopotamus	Tiresome	Irritated
Autumn	Postman	Soldier
Weep	Written interaction	Balloon
Pyramid	Greed	Pancake
Honesty	Hope	Confused
Investigate	Rose	Shudder
Research	Hypothesise	Imminent
Poke	Zoo	Betrayal
Summer	Miracle	Clown
Augmentation	Treat	Abbreviation
Debate	Assessment	Theme
Obstacle	Hallucination	Logic

Figure 4. Mini-task focused on learning strategies for teaching vocabulary in the target language.

The mini-task in Figure 4 required the students to prepare answers before the seminar. This would normally be prepared by students beforehand, and then practiced in groups during the seminar. During the practice stage, the teacher would circulate the room and listen to common strengths and errors. The students would then receive instant formative feedback which would prompt them towards higher quality answers. In the digital classroom, a much higher level of autonomy was required. After completing the mini-task, students were asked to reflect on what was difficult about the task, and create their own "lessons learnt" from the exercise. Essentially, the students were creating their own formative feedback.

USEF1G : Dealing With Error

Task Description: A class of year 3 students were given 10 minutes to draw a picture. They were then given 15 minutes to write a story about that picture. No other instructions were given.

Learner profile: This story is by Xu. Xu is an outgoing student. Xu often mixes languages when they speak. Xu speaks at least three languages that you know of.

Your task: Choose what kind of feedback you want to provide for Xu based on errors they have made. You can use any technique and medium you wish. The aim of the feedback is to allow Xu to make improvements to their writing, and to support future learning. Bring your feedback to class. Be prepared to discuss and support your assessment choices.

Figure 5. Mini-task focused on giving feedback on learners' texts.

Figure 5 gives the instructions for another example of a mini-task given to students which was accompanied by a piece of text written by a Swedish primary-school pupil in English. This mini-task would normally be prepared at home, and then explored in group work during a seminar where the teacher would circulate the room and provide instant formative feedback. In an online version of this task students compared answers in groups and then fed back to the whole class; in essence an extended version of the think-pair-share model. This involved a higher level of learner autonomy, but also a greater need for whole-class feedback from the teacher. Since the teacher was not able to pick up on students' errors as they happened, the teacher shared some common mistakes with the students first. Then, students worked autonomously in breakout rooms. The teacher was then able to collect information during the "share" stage and provide whole-class feedback instead.

Teacher Education During Isolation: Virtual Worklabs for Community and Accountability

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This chapter introduces and examines the use of online worklabs to support teacher education during the abrupt movement to virtual learning during the COVID spring semester of 2020. Autoethnography provided various lenses (i.e., instructor and students) of implementing virtual worklabs to support education students. The virtual worklabs built accountability, provided immediate feedback, increased motivation, and improved productivity. Worklabs also built community among education students, exposed them to virtual platforms, and created a supportive professional learning community for both academic and social-emotional wellbeing. Teacher educators and education students can benefit from reproducing these virtual worklab opportunities whether continuing distance-learning, hybrid courses, or returning to traditional educational environments.

INTRODUCTION

The benefit of collaboration and community in the field of education has moved outside of the classroom as learning has transitioned online. Motivation, accountability, and the company of others—while working simultaneously on individual projects—are core goals of online working environments (Barry, 2019; Mazak, 2019). Working from home in isolation can prove to increase negative habits and self-interruption where electronics move us away from collaboration towards escapism (Dabbish et al., 2011; Zomorodi, 2017).

Virtual worklabs for education students provided a practical solution during a time when they were not able to physically meet with professors or classmates. Carfagna (2014) encourages the use of online learning ecologies to foster peer collaboration and increased connectedness which should be fluid in teacher education for students and for transferring to K-12 classrooms. Context and various other factors play into constructing quality online working environments (Leeman & Altman, 2020; Stockleben et al., 2017) but during the time of COVID, community and accountability were essential.

INNOVATION

Online worklabs reinforced and modeled affinity networks (Ito et al., 2020) of common interests or goals that could also be transferred to the K-12 online classroom. Creating a constructivist atmosphere through an online environment presents its challenges (Stockelben et al., 2016). However, the commonality of working on individual topics with a universal structure, provided opportunities for a collaborative model to surface, thus building an atmosphere of working alone, yet together. Through autoethnography, we've (i.e., teacher educator and education students) come to understand the intricacies of shared benefits through this micro-culture that emerged during the abrupt shift to online learning (Privitera & Ahlgrim-Delzell, 2019). Participants began to recognize each other as resources and support began to shift from reliance on the instructor to a collaborative community of professional support among the students (Carfagna, 2014; Stockelben et al., 2017).

Instructor experience

Worklabs were staggered (i.e., Tuesdays 7-9 p.m., Thursdays 12-2 p.m., and Saturdays 8-10 a.m.) to accommodate flexibility for essential workers, childcare needs, or other unforeseen circumstances while adhering to stay-at-home orders. Considering "cognitive and social processes take place in online settings," it was important to offer a virtual meeting space where the instructor was available during the synchronous time to encourage check-ins at both the academic and personal levels (Stockleben et al., 2017, p. 583). An infographic (see Appendix) was created and distributed to guide expectations of students. Through the addition of online worklabs, channels for feedback were expanded (Stockleben et al., 2017) to include live verbal feedback (e.g., virtual meeting, phone), textual feedback (e.g., chat, email, comments on documents), or recorded feedback (e.g., Mote extension, screencasts).

Student experience

During this experience, education students from four different stages of their research projects came together to collaborate, inquire, and most importantly, build community. As the group convened virtually, students shared personal concerns and celebrations. Since meeting in person wasn't an option, this connectivity provided the accountability missing during isolation. Since working from home can be challenging (Dabbish et al., 2011; Zomorodi, 2017) the addition of multiple worklabs provided motivation to join.

During check-ins at the beginning of the lab and at each hour participants discussed goals, questions, or challenges related to their work. As this platform allowed others to listen in, they could echo the same questions, allowing for small group collaboration, rather than individual conferences with the teacher educator (Carfagna, 2014). Participants collaborated from home during a structured timeframe with the knowledge that peers were working concurrently to achieve similar goals. Some participants rarely missed a worklab, and through this experience formed a professional learning community (PLC) in which they continue to support each other professionally and personally.

RESULTS

Early results through an autoethnographic lens demonstrate a micro-community formed during these sessions (Adams et al., 2014). This method allowed the authors to understand the process of worklabs from a relational aspect and not solely a production/academic perspective. It is clear that this environment connected to the need of community during this time of isolation. As the worklabs progressed, the structure of each meeting was co-designed by faculty and students to authentically meet individual needs (Leeman & Altman, 2020). The instructor was able to advise multiple students simultaneously when they all shared a similar question or provide feedback privately to individual students as needed. The immediate feedback served as a powerful incentive for students to participate in the worklabs, as they instantly received answers to their questions and concerns supporting the immediacy of modern-day demands (Zomorodi, 2017). Out of the eight graduate students who completed their thesis studies during COVID Spring, seven of them attended worklabs regularly or as silent participants during the scheduled time.

The labs created education communities which modeled mindful course design and acknowledged a "multi-dimensional online presence" to meet students' needs, investments, emotions, and accountability (Leeman & Altman, 2020). These PLCs provided a space to learn together and can be replicated during virtual settings to enhance student learning (Stoll et al., 2006). Participation in the worklabs afforded participants a virtual confidence that was novel for both preservice and inservice teachers. This can be modeled through education courses or professional development (PD) focused on providing teachers exposure and experience with online platforms for facilitation of virtual learning in K-12. With the movement to online learning, educators found themselves having to navigate unfamiliar territory. To aid teachers in gaining certainty in their ability to utilize technology, Ertmer et al. (2010) suggested, "the most powerful strategy appears to be helping teachers gain personal experiences that are successful (personal mastery), although other methods can also increase self-efficacy (e.g., vicarious experiences, persuasion)," (p. 261). The virtual worklabs provided the experience and courage for preservice and inservice educators to tackle the technology design of online teaching.

Teacher educators can authentically design digital learning environments (see Table 1) and purposeful communities which support the whole student (Leeman & Altman, 2020; Mazak, 2019). Other teacher educators and education students were invited to join these worklabs to support distance learning and learn from this model. Their participation demonstrated how "networked technologies can help build support for learning and social capital," to shift beyond education courses (Ito et al., 2020, p. 43). These practices also demonstrate how preservice and inservice teachers can transfer this design into the K-12 classroom as we move forward after current stay-at-home orders.

Table 1
Teacher Educators Replication of Virtual Worklabs

Modeling	Actions	Other Suggestions
Set-up	• Comfort with platform (e.g., Meet, Zoom) • Infographic: bit.ly/TEvirtualworklab • Flexibility-Multiple days/times	• Break out sessions (group options) • Mentor sessions • Specific topics
Beginning check-in	• Share good news and goals for work time • Ask/respond to questions • Mute and hide video for independent work	• Student facilitators • Share group norms
Independent work & Feedback	• Verbal (e.g., video, phone call) • Textual (e.g., chat, comments, email) • Recorded (e.g., Chrome extensions)	• Pre-set how to list • Pre-recorded screencasts for common topics
Mid-point check-in	• Brief audio/video reconnection to take a mental break • Share out progress or struggles • Ask questions	• Motivational music alarms for check-ins • Tips for tech use (e.g., keyboard shortcuts, platform tools)
Final check-in	• Share out progress or goals met • Final questions and next steps	• Goal setting for between meetings • Set-up 1:1 meetings as needed
Accountability	• Individual goals • No due dates, word count, etc. • Consistent routine • Drop in/out options	• Exit slips, due dates • Group goals • Required attendance • Celebrations

Note. https://bit.ly/TEvirtualworklab is generic and sharable

Future Research

There is a need to better understand how virtual worklabs impact the practice of teacher education for preservice and in-service educators at the macro-level and through a full ethnographic research study. Broad areas of future research include attendance policies based on needs of a course or understanding how this tool can be integrated in hybrid courses to enhance a supportive community, foster collaboration, and create accountability. Virtual worklabs hold promise as

a model for inservice teachers for use in PLCs or for PD (e.g., individual data interpretation or curriculum design). As well, it will be promising to understand the use of virtual worklabs to better utilize affinity networks (Ito et al., 2020), authentic co-design (Leeman & Altman, 2020), online relationship building (Stockleben et al., 2017), and transfer of these processes from education courses into K-12 learning environments. Teacher education can model navigation of online workspaces beyond the four walls to move students towards building accountability and virtual communities.

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OVERVIEW

Two-hour sessions:
1. Check-in with goals at the beginning; mute then individually work
2. Break and say hello after the first hour; then mute and work
3. Check-in at the end to share progress

JOIN IN

Click on "Join with Google Meet" in the calendar invite

BEFORE WORK LABS

-Make a list of your action plan for the session
-Write down questions

DURING WORKLABS

-Ask questions in Chat
-Post resources to share in Chat
-Mute and hide camera during work time
-Drop in/out at any time

TIPS

-Turn off your phone
-Work on one screen
-Close email tab(s)
-Close other distracting tabs

SPACE

-Quiet & comfortable
-Organize work area
-Have drinks & snacks
-Consider headphones

VIRTUAL WORKLABS

Sa 8-10a, Tu 7-9p, & Th 12-2p

Sp Adobe Spark

Note. https://bit.ly/TEvirtualworklab is the generic and shareable version of this infographic

Take Back Social Constructivism: A Process for Teachers Educators to Design Collaborative, Asynchronous Learning Experiences for Pre-Service Teachers

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The shift to online instruction and "remote" teaching does not mean teacher educators have to abandon social constructivist teaching methods. To support teacher educators, this chapter provides an instructional design process for blending social constructivist teaching methods with edtech to engage pre-service teachers in digital learning experiences that are asynchronous, collaborative, and engaging. This design process leverages a pre-existing framework and lesson planning technique to provide a scaffold that teacher educators can use to create these learning experiences, and it concludes with implications for them to use this design process with their pre-service teachers.

Keywords: instructional design, edtech, educational technologies, constructivism, social constructivism, asynchronous learning, pre-service teachers, teacher educators, backwards planning

INTRODUCTION

Social constructivism is a hallmark of American teacher education programs (Beck & Kosnik, 2006; Girvan et al., 2016), and it was lost with the shift to online instruction and remote teaching in the spring of 2020. At its core, constructivism posits that students build or "construct" knowledge and skills by having active learning experiences connected to a topic (Richardson, 2003). Social constructivism adds a layer of interaction to constructivism, and it emphasizes collaborative, interactive experiences for learners that results in their co-construction of knowledge (Tagney, et al., 2001). For example, students working together to problem solve in response to a local issue or conducting an experiment with a partner exemplify social constructivist teaching. However, when teacher educators shifted their instruction, social constructivist teaching methods were largely replaced with instructor-led, video-conference sessions with limited interactivity, and Supiano (2020) reported that those sessions were poorly received by both instructors and students. In response, this chapter offers teacher educators a process for designing instruction that combines social constructivist teaching methods with educational technologies (edtech).

To share the design process, this chapter will first describe the framework used as its basis and then provide key pedagogical considerations and technology recommendations for implementing it. Next, it will offer teacher educators specific implications for using this process with their pre-service teachers (PSTs) before concluding with suggestions for future research.

Framework Overview

Lee and Hannafin's (2016) "Own It, Learn It, Share It" framework includes three stages for designing active learning experiences. First, students must "own" the learning if they are to be invested in it, which is built by students creating personalized learning goals and making relevant connections between the topic and themselves. Second, students "learn" the topic by instructors modeling skills, deconstructing complex points, and creating authentic experiences for students to engage. Finally, students "share" by creating a learning artifact of some kind and presenting it to an audience for feedback. Because the framework can be used across physical and digital contexts along with grade levels and content areas, it does not prescribe specific activities. However, instructors can use "backward design" with that framework to develop asynchronous learning activities that utilize social constructivist teaching strategies.

A Process for Designing Asynchronous, Student-Centered Learning Experiences

Backwards design is a lesson planning technique that requires instructors to first identify the student learning outcomes – what students will know and/or be able to do – after completing a particular learning experience (Graff, 2011). Next, they work in reverse order to plan the experiences students will need to satisfy the learning outcomes. When designing asynchronous social constructivist learning activities, instructors must pair pedagogical strategies with intuitive technologies to engage students. To support instructors, Table 1 overlays a backwards design method onto the "Own It, Learn It, Share It" framework that is aligned to key pedagogical questions and technology recommendations to use when designing these learning experiences.

Table 1

A design process for creating modules

Framework Stage	Key Pedagogical Questions	EdTech Recommendations
Share It	1. How will students demonstrate their knowledge of the content or competency of the skill?	Learning Artifacts
	2. What type of feedback will be provided to students?	Community Platforms
Learn It	1. How can the content or skill be presented in ways that engage students?	Engaging Platforms
	2. Where are the opportunities for collaboration and sharing ideas with the learning community?	Digital Networks
Own It	1. What pre-existing knowledge or experiences do students have about the topic?	Discussion Boards
	2. What differentiated strategies or personalized learning opportunities can be offered to students?	Mind Maps

To use this table, the first key pedagogical question must be addressed in each stage before addressing the second, and the next paragraphs will further describe the stages, questions, and edtech recommendations.

The "Share It" stage is where students must demonstrate their knowledge of the content or competency of the skill to satisfy the learning outcome and then get feedback. For this stage, instructors must first select the artifact students will produce to satisfy the learning outcome, and these options range from infographics, recorded presentations, and animated slideshows to traditional quizzes, reports, and papers. Next, students must post their artifact or a link to it on a community platform, so their classmates and instructors can access it and offer feedback. Platforms that function as digital corkboards along with shared documents and slides work well for these purposes because they are intuitive and students often have experience with them. Instructors can also provide example artifacts and model feedback to help communicate their expectations.

The "Learn It" stage provides student-centered experiences focused on a topic and opportunities to engage a community of learners. These experiences must utilize the learning sciences to actively engage students in the knowledge or skills, and examples of leveraging technologies for these purposes includes using short videos to present information, virtual labs to apply knowledge or practice skills, and digital texts to transact with ideas. Students can next engage digital networks – whether in their own class learning community or a broader network including social media – to exchange in a flow of ideas, with the goal being for students to expand their learning by transacting with a community of knowledgeable members.

The "Own It" stage focuses on students first sharing their pre-existing knowledge or experiences they have about the topic and then creating a learning goal. By sharing, it activates students' schema about the topic and prepares them to engage it, which leads to deeper learning, and students can share their knowledge or experiences using video-based or written discussion boards. Next, students make a learning goal for themselves that is aligned to the outcome using a mind mapping tool, and the map should include the steps students need to take to achieve their goal. This map then becomes a personalized foundation for the entire learning experience.

This process was used to design a series of asynchronous modules on Design Thinking (https://designthinkingmeite. web.unc.edu/), which readers can view to further conceptualize this design process in practice. Next, implications for teacher educators who are interested in using this process to offset their reliance on video-conferencing platforms will be offered.

IMPLICATIONS

The shift to online instruction and remote teaching does not require teacher educators to abandon social constructivist teaching methods (Girvan et al., 2016); however, it does require them to move their instruction online. The process outlined in this chapter provides them a practical method for blending asynchronous edtech for online instruction that promotes social interaction, personalized instruction, and project-based learning, and there are direct implications for using it as part of the preparation of PSTs.

First, the "shift" demonstrated that K12 teachers and teacher educators must be able to provide meaningful instruction online, and teacher educators can use this design process to offer those instructional experiences to PSTs as learners before having them deconstruct those experiences as future educators. To begin, teacher educators can use the design process to create a series of modules about a topic for their PSTs to complete (e.g., lesson planning, assessment types, etc.). After PSTs complete the modules, a debriefing session is held – either online using a video-conferencing platform or in a face-to-face session – about the modules. During that session, teacher educators first tend to any follow-up questions the PSTs have about the topic. Next, they intentionally explain their use of backwards design (Graff, 2011) and the "Own It, Learn It, Share It" (Lee & Hannafin, 2016) framework within the modules. Specifically, they explain how they used backwards design to first identify the learning outcomes and then worked in reverse order to ensure that the experiences their PSTs would need to achieve the outcome were integrated into each module, and they can reference specific examples during that explanation. They can also share their use of the "Own It, Learn It, Share It" framework's stages and their responses to the key pedagogical questions from Table 1 to further demonstrate their design process. A central tenet of social constructivism is that individuals need to have background knowledge about a topic in order to develop further knowledge about it (Kalina & Powell, 2009). By having PSTs first experience the modules as learners, it prepares them with the background knowledge needed to co-construct knowledge during the debriefing session.

Next, this design process provides teacher educators an opportunity to improve their use of edtech for teaching and learning through the social construction of knowledge with their students (Kalina & Powell, 2009). To support teacher educators, Table 1 includes edtech recommendations, and they can search online databases of edtech – Common Sense Media (www.commonsensemedia.org/app-lists), EdShelf (www.edshelf.com), App Ed Review (www.appedreview.com/app) – for locating tools aligned to those recommendations. They can then create a class project for their PSTs to crowd-source edtech recommendations. For example, they can create shared documents that describe a specific edtech functionality that is aligned to Table 1 and have their PSTs populate those documents with edtech recommendations. This crowd-sourcing represents the co-construction of knowledge (Tagney, et al., 2001) because the PSTs are sharing the edtech they found and how it can be leveraged for teaching and learning. These recommendations can then be a resource for PSTs to build their own learning modules.

Future Research

The ultimate goal for this design process is that it becomes a scaffold for teacher educators and PSTs to use for creating engaging online instruction, and future researchers can evaluate its effectiveness. For example, researchers can first develop a rubric specifically for assessing social constructivist teaching methods being used in online instruction. Next, they can partner with teacher educators and request that they include the activities described in the implications into their course as well as develop an assignment for PSTs to create online learning modules using this design process. Researchers can then use the rubric to evaluate those modules along with surveying and interviewing the PSTs about the design process to identify areas of strength as well as those for improvement.

In close, this design process offers teacher educators and PSTs an innovative scaffold for creating online instruction. Online instruction does not have to be limited to video-conferencing platforms, and teacher educators have an opportunity to be leaders in redefining the look, feel, and experience of online education. The instructional design process described in this chapter is intended to support them in that important work.

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Professional Development for Remote Learning in Teacher Education to Support Teacher Educators and Preservice Teachers during the COVID-19 Pandemic

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Teacher educators, preservice candidates, and in-service teachers are greatly challenged by the COVID-19 pandemic. Since March 2020, teacher educators have been engaged in serious heavy lifting to minimize the impact of school closures, canceled student teaching, and postponed teaching abroad programs. They have spent hours moving instruction online and supporting the educational and emotional needs of their students. Best practices that ensure a smooth transition to remote learning, engage preservice teachers in online learning, and provide professional learning opportunities to teacher educators emerged organically during this process. The collective efforts are worthy of documenting and have been highlighted in this paper. Professional development strategies used to facilitate the transition and sustainability of remote learning in our teacher education program are discussed.

INTRODUCTION

Bagwell College of Education at Kennesaw State University has a large P-12 educator preparation program, which serves more than 3,000 preservice teachers and graduate students. Before the pandemic, almost all the courses were offered face-to-face at the undergraduate level. Some teacher educators had limited experience in teaching remotely. Moreover, most preservice teachers have never taken an online course. With a sudden notice to transition to remote learning, teacher educators need ongoing support and professional development (PD) to increase their Teacher Educator Technology Competencies (TETCs) (Foulger et al., 2017). TETCs comprise of 12 competencies teacher educators need to master to develop students' technological pedagogical content knowledge (TPACK) (Mishra & Koehler, 2006). For the current situation, a few of them are particularly needed (see Table 1).

Table 1
TETCs Needed During Remote Learning (Foulger et al., 2017)

4. Teacher educators will use online tools to enhance teaching and learning.
a) Communicate using online tools.   b) Collaborate using online tools.   c) Design instruction using online tools.   d) Assess teacher candidates using online tools.
6. Teacher educators will use appropriate technology tools for assessment.
a) Use technology to assess teacher candidates' competence and knowledge.   b) Model a variety of assessment practices that use technology.   c) Provide opportunities for teacher candidates to use appropriate technology for assessment.

	7. Teacher educators will use effective strategies for teaching online and/or blended/hybrid learning environments.
	a) Model online and blended learning methods and strategies. b) Provide opportunities for teacher candidates to practice teaching online and/or in blended/hybrid learning environments.
	10. Teacher educators will engage in ongoing professional development and networking activities to improve the integration of technology in teaching.
	a) Define goals for personal growth in using technology. b) Engage in continuous professional development and networking activities promoting technology knowledge and skills. c) Support teacher candidates' continuous participation in networking activities to increase their knowledge of technology.
	12. Teacher educators will apply basic troubleshooting skills to resolve technology issues. Each competency is accompanied by a list of specific skills.
	a) Configure digital devices for teaching. b) Operate digital devices during teaching. c) Model basic troubleshooting skills during teaching. d) Find solutions to problems related to technology using a variety of resources.

These competencies are an appropriate frame to use for faculty development. During the pandemic, our college instructional technology team provided professional development to faculty that addressed the five competencies mentioned above as they are the most aligned with remote learning. One-on-one mentoring and group webinars are used as the primary methods to provide teacher educators with professional development and model the use of the TETCs (Kay, 2006; Polly et al., 2010).

INNOVATION

The college instructional technology team, composed of an instructional designer, a distance learning coordinator, a technology coach, and the special assistant to the dean for technology, stepped up to provide continuous leadership and support for faculty and staff during the pandemic. A week before the remote transition began, the team started preparations to provide PD, focusing on the technology competencies teacher educators needed the most during the pandemic (Foulger et al., 2017). They set up headquarters in a computer lab, providing PD to faculty and staff on the following topics: how to use our learning management system, deliver online sessions with students, host virtual office hours, hold virtual meetings, assess students online, help students communicate and collaborate using online tools, design instruction using online tools, configure digital devices for teaching, operate digital devices during teaching, model basic troubleshooting skills during teaching, and troubleshoot and find solutions. The team worked with faculty and staff one-on-one, hosted mini sessions, delivered whole group sessions, responded to phone calls, answered emails and texts, and took their support directly to faculty and staff offices (Kay, 2006; Polly et al., 2010). They even offered their services to the entire university, and faculty outside the college showed up in the lab for assistance. The college's UITS support specialists also stepped up to answer technical questions (TECT #12), while the graduate librarian spent time in the lab sharing resources and tools to support online teaching and research (TETC #10). Most importantly, the faculty and staff began supporting one another. These professional development efforts contributed to a smooth, but fast-paced transition from face-to-face to remote learning in the college.

As we moved into the remote learning period, the instructional technology team continued to offer PD and assistance to teacher educators focusing on developing their teacher education technology competencies and helping them solve any emerging issues. They quickly began delivering live webinars focusing on a range of topics, from digital communication and collaboration tools to discussions on remote learning pedagogies and culturally-responsive teaching. A webpage was created and continuously updated with links to remote learning resources and on-demand videos of the PD webinars (https://bagwell.kennesaw.edu/faculty-staff/tech-live-faculty-staff.php). The PD webinars were recorded in Microsoft Teams through Stream. Currently, Stream is not available to individuals outside the institution. Our UITS specialists are working on opening up access. The team was using Microsoft Teams for the first time, and this limitation of external access was one of the many things we learned throughout this process. Prior to the pandemic, the team had created a BCOE Tech Challenge page for ongoing professional development (https://spark.adobe.com/page/r9GW2ST-bQp4zz/) that allows faculty to earn badges as they participate in professional learning sessions. This was also helpful to

faculty and staff during the transition to remote learning.

Table 2
Webinar topics aligned to the TETCs (Foulger et al., 2017)

TETCs	PD Webinars
4. Teacher educators will use online tools to enhance teaching and learning.	Collaborate Ultra (https://bit.ly/3gKVMcl), Kaltura Capture I (https://bit.ly/2ABwAUK), Outlook (https://outlook.live.com/owa/), Adobe Spark (https://spark.adobe.com/), Kaltura Capture II, iMovie (https://www.apple.com/imovie/), Twitter I (https://twitter.com/explore), Nearpod I (https://nearpod.com/), Nearpod II
6. Teacher educators will use appropriate technology tools for assessment.	OneDrive (https://bit.ly/3dvWl7x), OneNote (https://bit.ly/3eJvvsN), Microsoft Forms I, Edpuzzle (https://edpuzzle.com/), Microsoft Forms II, D2L: Gradebooks, D2L: Rubric
7. Teacher educators will use effective strategies for teaching online and/or blended/hybrid learning environments.	Facilitating Effective Meetings in Teams (https://bit.ly/2XVSZUP), Enhance your course with video using Kaltura Capture, Creating a video for your class using Kaltura Capture, Culturally-Responsive teaching in the virtual classroom, Canva (https://bit.ly/2MrMFzk), Replacing discussion forums with Flipgrid (https://info.flipgrid.com/), Online instructor presence
10. Teacher educators will engage in ongoing professional development and networking activities to improve the integration of technology in teaching.	Pandemic Pedagogy, KSU Library Resources (https://bit.ly/3dyL9ao), Accessibility 101

RESULTS

Overall, we had more than 300 enrollments of faculty and staff in the live PD sessions offered so far, and some from our college and perhaps other colleges who watched the video recordings on-demand. Faculty and staff commented that these targeted PD sessions helped them teach remotely during the crisis. In practice, when the courses were transitioned to an online format, teacher educators implemented several strategies, such as designing short, chunked online tutorials for course content (Hsin & Cigas, 2013), changing classroom sessions to synchronous sessions, offering more virtual office hours (Li & Pitts, 2009), and designing assessment using online tools. Some faculty designed tutorial videos to cover much of the course content to avoid lecturing during synchronous sessions. They could then spend online "class" time providing live feedback on assignments and projects. This flipped classroom strategy made the online sessions much more productive and effective for both faculty and students (Abeysekera & Dawson, 2015). Faculty offered more virtual office hours to build a safe space for students to ask for help and to remain accessible (Li & Pitts, 2009). Faculty have also modified assignments and assessments using online tools to meet the needs of their students. For example, one project was changed to require preservice teachers to create an authentic learning packet that included five days of digital learning materials for a K-12 classroom. Some students shared their packets with their mentor teachers. Preservice teachers spoke highly of this authentic change and other strategies used for remote learning. They commented on how it prepared them to design learning experiences for a real crisis. Additionally, the faculty in the Inclusive Education Department have been using the Avatar Lab, a mixed-reality simulation that combines virtual reality (VR) and augmented reality (AR), to provide teacher candidates the opportunity to deliver live lessons in a simulated classroom (Driver et al., 2018).

IMPLICATIONS

During the PD sessions, it became apparent how overwhelmed teacher educators were by this disruption. While some have previous experience with online learning, some did not. Additionally, the abrupt nature of this pandemic did

not give faculty time to fully redesign face-to-face courses for an online environment. Despite these many challenges, faculty have stepped up to participate in PD sessions to learn how to teach remotely when remote learning became necessary. **Our first implication is with or without the pandemic, technology integration, especially including online/ blended/remote learning, is not only a must-have in teacher education programs but also has to be strong preparation for students** (Wang et al., 2019). In the future, teacher education programs should make detailed plans for professional learning to develop all 12 TETCs of teacher educators (Foulger et al., 2017). A starting point is to critically review the current reality of professional learning, focus on vision, needs assessment, current professional learning, alignment to the mission and vision, funding and incentives, diversity, collaboration, and evaluation. A survey asking teacher educators to indicate which TETCs they need support and PD is another method. The review and survey results will lend insights into what competencies teacher educators need for PD. Different programs will have various priorities to address. Each program should work on an individualized plan to provide targeted PD to its teacher educators (Loughran, 2014; MacPhail et al., 2019).

Our second implication is that teacher educators need support from peers professionally and emotionally. We found that teacher educators wanted not only to learn online pedagogy and technology tools, but they also wanted to connect online with their colleagues. Before the start of each webinar session, faculty and staff had the opportunity to "see" and support one other. Comments to the tech team indicated how much they appreciated the chance to come together to learn and support the emotional well-being of one another. We suggest other teacher education programs consider forming communities of practice (Lave, 1991) for teacher educators based on the content areas so they can not only support each other but also discuss content-specific technology integration and their PD needs.

Our third implication is that we need to pay special attention to pre-service teachers' emotional needs and well-being during a crisis and make sound plans to cultivate their emotional well-being during remote learning. We learned that most undergraduate preservice teachers have never taken an online course. The transition has been stressful. Losing the modeling, support, and community of practice (COP) is challenging (Lave, 1991). We suggest that teacher educators be flexible and pay extra attention to the emotional needs and well-being of their students (Vandervoort, 2006). Teacher educators should strive to build a safe online environment for them to get comfortable with remote learning (Brown, 2011). As Turner and Harder (2018) suggested, three defining attributes of a psychologically safe environment are making mistakes without consequences, qualities of the facilitator, and orientation activities. Teacher educators should consider these attributes when building a remote learning environment. More digital formative assessments should be created to engage students during synchronous sessions (Vonderwell & Boboc, 2013). Different platforms and devices used by students, such as PC, Mac, Chromebooks, tablets, and mobile devices, make remote learning challenging. Faculty must get familiar with these various platforms and devices to support their students.

FUTURE RESEARCH

In the future, our tech team plans to continue offering targeted live sessions and one-on-one mentoring to our teacher educators on topics most relevant and meaningful to them (MacPhail et al., 2019). We have added a question to the evaluation for their recommendations for future sessions. We also uploaded the recordings onto a resource webpage so faculty in the college and university can watch the professional development sessions on demand. We hope to offer more professional learning that develops all 12 TETCs of the teacher educators in our college (Foulger et al., 2017). With this action plan, we will be more systematic in researching how to use PD to develop all 12 TETCs of teacher educators (Foulger et al., 2017), as well as the effects of PD for teacher educators on students' development of their TPACK (Mishra & Koehler, 2006).

For our pre-service teachers, we have just begun to offer live webinars. We have had an overwhelming number of students attend the sessions so far because they want to be prepared for remote learning as they go into their clinical experiences in the fall. Some pre-service teachers who just graduated attended these live sessions as well because they were concerned about getting a teaching job in the fall and wanted to be fully prepared for remote learning. We see the need to continue offering these live sessions to students and alumni. We are also looking into offering these live webinars to our collaborating teachers in our partner school districts. This growing need calls for a systematic research on how pre-service teachers develop their TPACK during the program and then TPACK-Practical in their teaching professions, as well as how PD contributes to those (Yeh et al, 2014).

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Action Research on Remote Teaching as an Instrument for Reflection on Online and Face-To-Face Teaching

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In this paper we report on an action research project on remote teaching that we designed for students of the preservice graduate teacher education program at the University of Amsterdam when schools closed due to the Covid-19 pandemic. The students were instructed to keep a teaching diary to record their experiences with online teaching for a period of four weeks, which, they reported, helped them to adjust to their new reality. We have, therefore, decided to build on this task and use it as the starting-point of a more elaborate project. One of the most interesting outcome of the project so far is that a first analysis of the entries in the diaries show that reflection on the constraints and affordances of *remote* teaching have led to reflection on *face-to-face* practices.

INTRODUCTION

When the Covid-19 pandemic forced the Dutch government to close down all schools in March 2020, the graduate students of the preservice Foreign Language Teacher Education course at the University of Amsterdam (*N*=12) had almost completed their 18 month teaching internship. The lockdown set them a daunting challenge: without any preparation they, as novice teachers, had to adjust to teaching their classes online. Well-established practices for remote teaching large groups of teenage students at middle and high school level were lacking and their supervisors, although experienced teachers, could only offer limited guidance and assistance. This meant that improvisation was key. But this challenge also created a unique opportunity: we could exploit the situation to set our students a task that would invite them to investigate *emerging* practices in remote teaching *in real time*.

INNOVATION

To help them navigate the unchartered territory of remote teaching and to scaffold systematic reflection on their experiences, we instructed our students to keep a teaching diary (e.g. Sá, 2002) for a period of four weeks that they would use to report on all the classes they taught (see Figure 1). The entries could consist of field notes; samples of student work; email/text messages from online conversations with colleagues at school, supervisors, peers, or students.

Figure 1. Teaching diary assignment.

As they were working on their diaries, the students informed us that the journal writing was helping them to adjust to the new reality and to make sense of the first, often overwhelming, experiences with remote teaching during the initial weeks of the lockdown. Therefore, we decided to build on this task and use the diaries as the starting-point of a more elaborate 'action research' project (cf. Burns, 2005; Leitch & Day, 2000). We instructed the students to categorize and analyze the entries (cf. 'content analysis', Sá 2002) in order to identify specific patterns and problems that need further exploration. Next, they will triangulate their findings (Green & Wallat, 1981) through consultation of external sources and write a structured, well-motivated plan of action to improve the next series of online classes they are set to teach in their internship schools. The results of their actions will be monitored in a second cycle of journal writing following the same procedure. Due to time constraints the data collection phase will probably end after these two rounds.

RESULTS

The first analysis of the diary entries of our students shows that during the first classes they taught they were immediately confronted with the constraints and affordances of online teaching. They struggle to get to terms with the drastic changes in the organization of the classroom discourse that are triggered by the remote setting (e.g. extended 'wait time' between teacher questions and student answers). They also observe that classroom management is more complex in video environments (e.g. Zoom or Microsoft Teams), which only show the upper body. Later entries show a more holistic view of teaching and learning. For instance, one student wrote the following:

> I noticed in the student assignments that were handed in that there were lots of issues they had not understood during class. It is really hard to give clear instructions if you get so little student response. Especially the weaker students tend to fall behind because of this.

After the first hectic weeks, as they develop routines and strategies to tackle the organizational and interactional problems, the students begin to make connections between these issues and the cognitive and pedagogical dimensions of teaching and learning

IMPLICATIONS

When Dutch schools closed due to the pandemic, our student teachers were not prepared for remote teaching – it is not a topic addressed in the curriculum. This meant that acting and learning needed to go hand in hand (cf. 'experiential learning'; Girvan et al. 2016) and activities and tasks needed to be devised that scaffolded their professional growth. What we have learned from the intervention reported on in this paper is that teaching diaries indeed can be successfully used as an instrument to promote student teachers' reflections on classroom practice and help them make sense of their

experiences in situations like this (cf. e.g., Moon 2006). To strengthen this effect we recommend the diary task to be followed by an action research project, since this framework will allow the students to improve on their teaching by systematic investigation of their practice through reiterative cycles of planning, observing, acting and reflecting (Kitchen & Stevens, 2008).

We would propose such a project to consist of the following phases:

- *Phase 1*. Diary writing to gather baseline data; content analysis: organization and analysis of the data to identify emerging patterns and problems;
- *Phase 2*. Triangulation: discussion and comparison of the data with other sources (peers, school and university supervisors, students); consultation of research on remote and online teaching;
- *Phase 3*. Plan of action: changes to be implemented in future remote teaching, based on the data and outcomes of phases 1 and 2;
- *Phase 4*. Diary writing to record implementation of plan of action;
- *Phase 5*. Assessment: evaluation of the effects of the implementation of the plan of action;
- *Phase 6*. Dissemination of results.

In phase 1 the students gather and analyze their baseline data. This is followed by a triangulation component (phase 2). This component is not an essential part of action research per se, but we include it because sharing experiences, practices and problems as well as pooling strategies and solutions, among as many interested parties as possible, is important, particularly in an unprecedented situation such as the pandemic. Also, we propose that the theoretical component of the triangulation phase - the search for research studies on remote and digital teaching and learning - will enable the students to put their personal ideas in a wider perspective and enrich their plan of action (cf. Kitchen & Stevens, 2008). The data collected in phases 1 and 2 feed into a structured plan of action (phase 3). This plan is implemented in their teaching and monitored in their diary during phase 4. The inquiry is completed with an assessment/evaluation of the effects of the changes projected in the plan of action (phase 5). Finally, to round off the project, the individual students can be instructed to write a report on the outcomes of their research and the lessons they have learnt or present these to a wider audience (phase 6).

FUTURE RESEARCH

One of the most interesting results of our intervention so far is the evidence we found in the diary entries that our students' reflection with regard to remote teaching have led to renewed and more refined reflections on face-to-face classroom teaching (e.g. on the importance of verbal and nonverbal student feedback and the role of informal classroom talk). One student shared the following:

> *Normally, when the students are working on a task individually, I walk around, and then students feel free to just ask me for help if they do not understand something. Or I see students talking to each other and inadvertently catch something like "Well, I don't know either.." or "I haven't got a clue". Then I grab a chair and go and help them. And if I find lots of the students have problems I go back to explaining things once more to the entire group. I try to solve this during the Zoom classes by sending them a private chat message now and then, when I see [in the digital environment they are working in] that they are making lots of mistakes or if I notice that they are not doing any work at all, but it does not work in the same way and I feel I am missing out on much information about how they are doing.*

We are planning to further explore this idea in the post-Covid-19 era, when face-to-face teaching has become the 'norm' once again, and create a task as part of the syllabus of the teacher education program that involves remote teaching. The assignment will instruct our student-teachers to design a series of lessons that they will teach online to a group of their internship school students, using a digital platform like Zoom or Microsoft Teams. We hypothesize that the change of perspective involved in this institutional task will allow novice teachers to re-frame, and critically re-think, existing practices in face-to-face teaching (cf. Bannink & Van Dam, 2007) in the same way the real-world change addressed in this paper has done.

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Future Teacher Training of Several Universities with MOOCs as OER

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To train future Austrian teachers in using digital media, a novel didactic design was implemented at several universities in Austria in summer semester 2019: The course includes the participation in a MOOC (massive open online course) on the topic, an accompanying group work at the universities and multiple-choice tests conducted at the universities. In the summer semester of 2020, due to the COVID-19 crisis, the group work and exams had to be switched to virtual space as well. Because the course materials are available under an open license, i.e. as open educational resources, further use is possible and offered.

INTRODUCTION

A fitting implementation of a training on technology-enhanced learning for future teacher is the use of online learning. In 2019, seven Austrian universities have developed a concept integrating digital media into teacher education and successfully implemented it: A Massive Open Online Course (in short MOOC, Mc Auley et al., 2010) was developed and combined with exercises at the participating universities for teacher education. Therefore, we build upon the idea, that MOOCs can be implemented in diverse different learning designs beside the pure online course participation (Hakami, 2019). In Ebner et al. (2020b) we describe seven different scenarios that we have implemented and supported within the last years as provider of Austria's first MOOC platform (iMooX.at). One scenario is to "blend" a MOOC with parallel activities in additional, interactive, typically real-life face-to-face activities such as a local learner club or parallel workshops. We call this approach of blending a former pure online course with face-to-face learning as "inverse blended learning" (Ebner et al., 2017, Ebner & Schön, 2019). If whole MOOCs get real-live and interactive add ons, we call this "inverse blended MOOC" or, if a MOOC gets implemented as a lecture "lecture-based MOOC" (Ebner et al., 2020b).

Within the following we show, how this development was a good preparation to the transition to pure online teaching in Austria mid of March 2020, just a week after the formal start of the summer semester. Nevertheless, we see already the development and implementation of an open licensed online course as the key innovation and will present its features as well within this contribution within the implication section.

INNOVATION

In summer semester 2019, the lecture and exercise "Teaching and learning with new media" was implemented as a MOOC accompanied by assignments in the learning management systems of the partner universities and three face-to-face appointments to support the group work, where learning videos were developed. The exam was an online multiple-choice test which was taken in person at the partner universities (see Figure 1). The assessment for the course comprises a successful MOOC participation, the video production (the result of the group work) and the exam.

Lecture with exercise "Teaching and learning with new media"
(Originally implemented in summer semester 2019 at six Austrian universities)
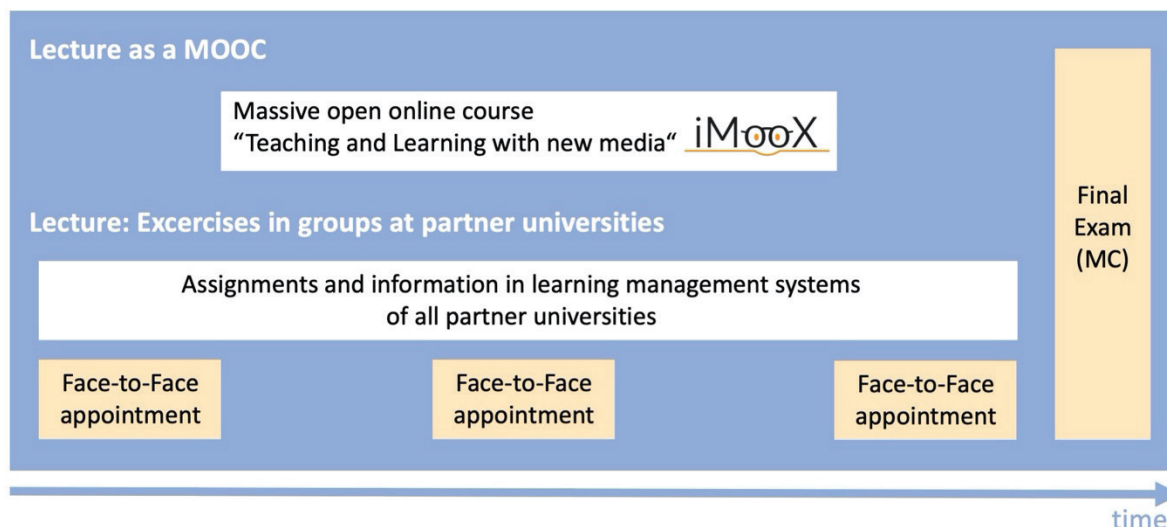
Figure 1. Design of lecture and exercise "Learning with new media" in 2019. Note: Online Implementation parts in white.

Several hundred students in the partner universities took part in the first implementation, and external learners could also participate in the MOOC: At all the universities in the network, 605 successfully passed the final examination including the corresponding exercise and successful MOOC (Ebner et al., 2020a, p. 73, see Table 1). It is important to understand that the open course infrastructure allowed others to participate as well, such as teachers or teacher students from other universities.

Table 1

Number of participants at the distinct parts of the MOOC "Learning with new media" in 2019 and lecture and exercise together. Source: Ebner et al. 2020a, Table 1, p. 73

Activity	Participants
Registered participants in MOOC (6 weeks)	1,482
Performed self-check test (one per week) in MOOC	4,767
Certification for successful MOOC participation	731
Successful participation at lecture and exercise (MOOC, group work, exam)	605

Because of the closure of the universities at the beginning of the COVID19 measures mid of March 2020 and the relocation of the complete classroom teaching to the virtual room, the design of this course also had to be adapted. Compared to other lectures and exercises, the transformation was rather simple: Group learning needed to be implemented online and the final exam will be an online test at the end of the current semester, which is available for a short time frame (see Figure 2).

Lecture with exercise "Teaching and learning with new media"
(Pure online variation implemented in summer semester 2020 at six Austrian universities)
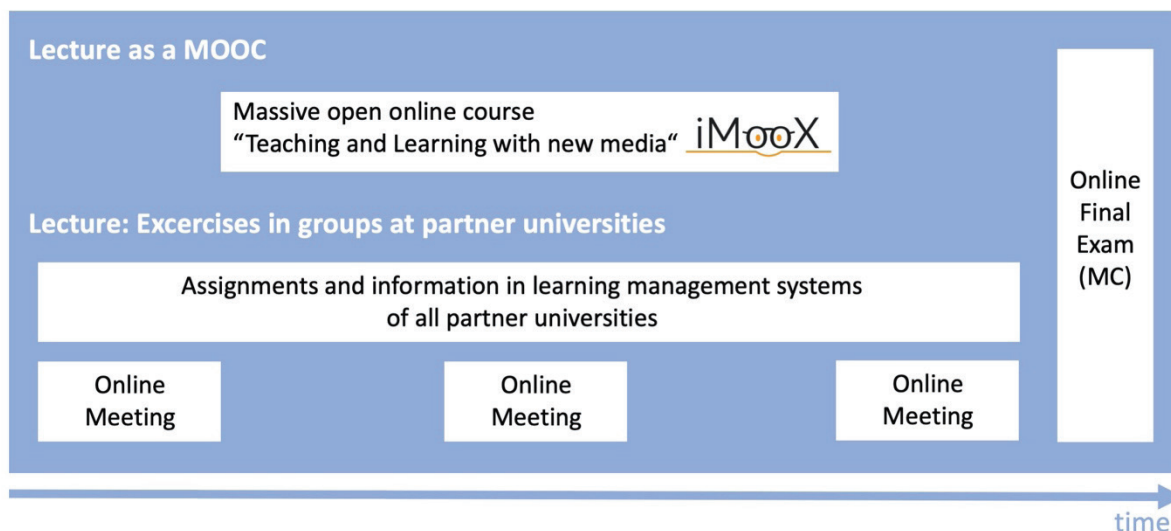
Figure 2. Design of lecture and exercise "Learning with new media" in 2020 in a pure online design.

Whereas the learning management systems and online meetings are not assessible for public, the MOOC is available (https://imoox.at/mooc/local/courseintro/views/startpage.php?id=99), all MOOC videos can be found at the Youtube platform as well (https://www.youtube.com/watch?v=y5C5pBzQovo&list=PLhy2nHJciTEC7PG2Pur6mriuwq6U6UYUl).

RESULTS

The students have evaluated the design positively in the first round (Ebner et al., 2020a, p. 74): "The location and time-independent processing and the associated lower number of attendance appointments were mentioned particularly positively. The possibility of repeating the lecture content at will and the permanent availability of the individual lessons were seen as very helpful. The possibility of repeating in the self-check tests was also mentioned several times."

Within the second round, now COVID-19 mode, the MOOC started on 2nd of March 2020 and counts 1,652 registered participants today (mid of May 2020). Currently, the students in the exercises are asked to produce learning videos, which might be a bit more complicated concerning group management and collaboration. If we would have had a clue about the future situation, we would have used a modified group work assignment: Collaborative and cooperative video development is possible online, but not trivial. Nevertheless, we see that the students find ways to deal with the situation and our team supports them as well with recommendation, e.g. to use video conferencing software for learning video production (see Ebner et al., 2020c).

IMPLICATIONS

We see our original design of an inverted MOOC with open educational resources (OER) for teacher training as a helpful innovation. This prior project brought several universities in the comfortable situation of being well-prepared for the summer semester 2020. Thus, we will describe as well aspects of this initial work in this paragraph.

First, this hitherto unique endeavor of a **joint teaching development of several universities** made it possible to bundle competencies in order to develop a standardized framework and materials in a relatively resource-saving manner. With the topic of the course, the pedagogical work with new media, the implementation as an online course is very fitting as well.

Second, the **MOOC framework and platform** made it possible, that participants share and communicate not only within the local learning groups and settings, but as well with students from other universities, experienced teachers and other learners. This joint learning adventure und the exchange with many others seems to be more stimulating than in an online course of a single class with only few updates and communication. And of course, it is nice to know that several people can participate

Third, the design as a **blended MOOC** with parallel local activities enriches the concept to a socially involved and adaptive concepts with the possibility of adaption to special conditions and circumstances (e.g. students teachers' disciplines). Not only within this original course design of 2019 and now adapted design of 2020, we experienced that implementation of a MOOC can be helpful, especially to reach a large group of students. Also the transfer from the former face-to-face group works and multiple-choice tests to a digital variant works currently quite well: Although the group work phase is still ongoing at most universities, first universities already had their final presentations of the group works as joint video conferences as well as the final assessments, such as the Graz University of Technology. According to the feedback of these students they are happy about the design of the course as it is far more interactive then several other lectures. So, the "inverse blended MOOC" (Ebner et al. 2020b) can be extended to a pure online scenario combining a MOOC as lecture with an online exercise and online exam.

Fourth and finally, we see the usage and development of **open educational resources** is part of the success as the open license allow to re-use, adapt and modify the used materials in the partner universities and beyond. Especially in the European copyright regulation with no fair use or public domain rules, this is key for cooperative projects in educational resources. In our case, all MOOCs at our platform iMooX.at are available under open licenses as open educational resources (in short OER, see Schaffert & Geser, 2008; Lane, 2018). iMooX.at provides several MOOCs, not only, but several for teachers, most of them in German language, some in English and other languages, for example "Informatik Fit" (bilingual), an introduction into computer science (https://imoox.at/mooc/course/view.php?id=71&lang=en). There are already multilingual courses, so that the operating menu is already available in many languages and prepared for translations (see Figure 3). So, this is as well an invitation to our readers and practitioners in teacher education: All materials at our platform can be copied, modified, for example translated as well to other contexts and platforms. A simple way to adapt the learning videos to your language are the subtitle function of Youtube where the course videos are hosted. If you find materials or courses of interest, please just use them under the conditions of the used licenses or contact the iMooX. at team or authors.

Figure 3. Screenshot of the MOOC "Learning with new media". Source: https://imoox.at/mooc/course/view.php?id=99&section=1&lang=en (2020-05-15)

FUTURE RESEARCH

For the specific MOOC or implementation of the course, we are currently preparing the evaluation, in which we want to obtain feedback from teachers and students. From the perspective of an Educational Technology unit and a MOOC platform host, we in general will intensive our research of different ways of development, adaptions and implementations of OER and MOOCs in higher education. We see open licensed materials especially helpful for international co-operations where materials are translated and transferred to other regional contexts. In our current research projects learning analytics plays as well a big role as it might support the learning activities, motivation and results of our participants.

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Meaningful and Reflective Virtual Professional Development with Preservice Teachers Amidst the COVID-19 Pandemic

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This chapter describes how the faculty of PedsAcademy, a partnership between the University of Central Florida and Nemours Children's Hospital, provided virtual professional development (PD) to preservice elementary education majors amidst the COVID-19 pandemic. The PD offered included synchronous sessions focused on disease-specific conditions that may be represented in students with or without disabilities and choice PD on STEAM- related technology tools that can enhance instruction. This chapter concludes with lessons learned and recommendations for successful PD and reflection in a remote learning environment.

Keywords: preservice teachers, professional development, reflection, technology, teacher candidates, STEAM learning, students with disabilities

INTRODUCTION

PedsAcademy is a pediatric school program between the University of Central Florida (UCF) and Nemours Children's Hospital in Orlando, Florida. This unique partnership includes a semester long internship for elementary preservice teachers (PSTs) who spend half of their internship I clinical placement in the hospital and the other half in a traditional, classroom setting. This collaborative clinical model is designed to enhance PSTs' knowledge and skills and reduce the educational inequalities for children with chronic and critical medical issues. Two major tenets of this model are embedded professional development (PD) and reflection (Henning, Git, & Beam, 2015). The American Association of Colleges for Teacher Education (AACTE) Clinical Practice Commission (2018) suggests that educators engage in PD and continuous reflection "to understand teaching, learning, students' needs, and social and contextual variables that affect their craft" (p.19). At PedsAcademy, PD is embedded into the internship model to help PSTs meet the unique learning needs of hospitalized children, therefore the PD is focused on common pediatric diseases/conditions, their educational implications, and technology tools to enhance instruction. Normally, PedsAcademy interns are provided with opportunities to apply PD learning during individual and small-group instruction with patients; allowing them to reflect upon successes and challenges and gain feedback from supervising faculty. Participation in these PD experiences contributes to an overall environment focused on continuous growth and development that mutually benefits the interns and the students they serve.

INNOVATION

The global COVID-19 pandemic resulted in a sudden shift to a remote internship model. Although our cohort of 18 PSTs were not able to return to the hospital during the Spring 2020 semester, the faculty continued to provide PD and opportunities for ongoing reflection virtually. Disease-specific PD was delivered synchronously via the Zoom platform and technology PD was provided using a "choice board" approach, tapping into interns' topic and situational interests (Flowerday & Shell, 2015).

Disease-specific Virtual PD: A Snapshot

It was imperative to offer disease-specific PD since interns were co-enrolled in an Exceptional Education course focused on disabilities. With five of the 14 disabilities under the Individuals with Disabilities Act (2004) related to medical issues, this PD directly aligned to their Exceptional Education course content. Futhermore, learning to adapt the learning environment and differentiate instruction to meet individual student needs are crucial skills for teacher effectiveness. Four synchronous PD sessions were delivered, focused on a different pediatric disease/condition.

The first disease-specific PD was aimed at helping PSTs learn how to support children recovering from a Traumatic Brain Injury (TBI). Via a short online presentation with supportive video clips and links, interns learned about the different types of TBIs, how they can impact school performance, and what accommodations/modifications teachers can make to support students with TBI in the classroom. To further enhance this virtual PD experience, a guest speaker was invited to share his recovery from a TBI. Other PD sessions focused on supporting students with cancer, teaching children with pulmonary diseases and disorders (e.g., Cystic Fibrosis), and helping students manage chronic pain. Reflective teaching practice (Schon, 1993) was encouraged during each PD session. Using the Zoom platform to its fullest (e.g., embedding polls, utilizing the chat function, and placing students in breakout rooms), interns were encouraged to engage with the content and think deeply about how the new information would inform future instructional decisions.

Technology Virtual PD: A Snapshot

To provide a differentiated and engaging virtual PD experience, we offered the technology PD utilizing a "choice board" approach. In their study of college students, Flowerday and Lane (2012) found that choice of learning leads to increased engagement and positively impacts motivation and performance. Furthermore, the positive effects of choice to support autonomy and intrinsic motivation are well established in educational research (Deci, Vallerand, Pelletier, & Ryan, 1991; Patall, 2013; Reeve & Jang, 2006) and were employed in our PD model. Interns were provided with a menu of PD options to choose from, each focused on a different technology tool for enhancing student engagement and learning (see Figure 1). All PD options were carefully selected by PedsAcademy faculty to ensure interns were provided with reputable, reliable digital content.

Figure 1. Professional Development Choice Board.

Interns were required to attend at least four of the PD options from the choice board. For each technology PD attended, interns completed a structured reflection using the 3-R format of reaction, relevance, and responsibility commonly used at UCF (University of Central Florida, 2005) (see Figure 2). In these reflections, interns stated how they felt about the new information, described how it related to teaching and learning, and how it could be applied to their future teaching.

A reflection is not a report of factual information. It is an expression of your expectations, perceptions, and feelings of the experience represented by your evidence. It is essentially a journal of your personal growth. Reflective writing can assume many different forms. However, in the event that you need guidance regarding the structure of a reflection, below is the 3-R format of reflective writing utilized by many students.

1. **Reaction**. (Affective Domain, To Feel). As you reexamine this evidence, how do you feel about it now? Cite at least one example that illustrates your response.
2. **Relevance**. (Cognitive Domain, To Think). How is the evidence related to teaching and learning? How is the evidence meaningful or how does it contribute to your understanding of teaching and learning? What are some alternative viewpoints or perspectives that you now have and/or what are some changes/improvements you might make based on the experiences you have had? Cite examples to support your ideas.
3. **Responsibility** (Psychomotor Domain, To Do). How will the knowledge gained from the event or experience be used in your profession? Give examples of possible applications in your professional life, as well as an analysis of possible alternatives, other perspectives, or other meanings that might be related to the evidence. What are some questions you still have regarding this topic?

Figure 2. 3-R Format of Reaction, Relevance, and Responsibility.

RESULTS

Analysis of PSTs' in-session chat messages and structured reflections demonstrated a deeper understanding of the instructional accommodations needed to support children with chronic and complex medical issues and the ways technology can be utilized to enhance students' learning. For example, as stated by one PST, "Knowing that children with cancer suffer from fatigue, I would incorporate structured breaks into the daily routine". Another PST reflected, "I truly was not aware of how much Dash can actually do, and how Dash (and even other robotics such as Sphero and KIBO) could support learning across several content areas."

Furthermore, end-of-the-semester survey (see Appendix) results from Spring 2020 showed that interns viewed the PD as both meaningful and relevant. All interns rated the PD sessions as effective or highly effective and when asked whether they would implement the PD content during future classroom instruction, for each session they reported likely or highly likely.

Interestingly, interns spontaneously used our GroupMe chat room to post about their PD experiences (see Figure 3) and suggest additional PD opportunities (see Figure 4). Many of them also purchased the technology tools featured in the PD for future classroom use (see Figure 5).
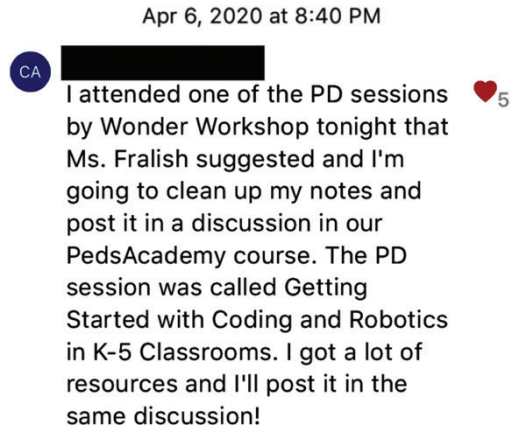
Figure 3. GroupMe Post Made by Intern About Robotics PD Session.
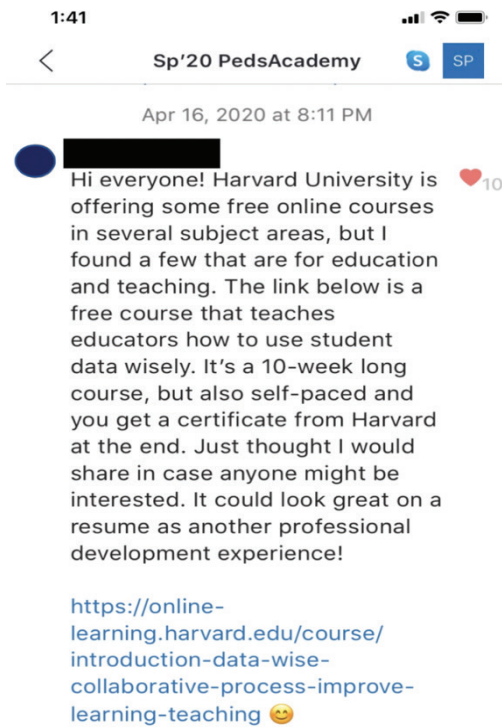
Figure 4. GroupMe Post Made by Intern About Additional PD Experiences.

Figure 5. GroupMe Post Made by Interns About Purchasing Tech Tools.

IMPLICATIONS

During this unprecedented time of remote learning, we have learned some important lessons related to two key hall-marks of effective teacher preparation: embedded PD and continuous reflection (AACTE, 2018). First, teacher educators should provide PSTs access to purposeful PD. Choosing what to offer and how to offer it is critical. Our PD aligned to our internship and course goals. Our PSTs had an interest in the PD topics offered which contributed to their engagement (Flowerday & Shell, 2015). Offering flexibility in the delivery of PD, such as recording synchronous sessions and using a "choice board" approach, gave interns choice and autonomy, further promoting their engagement with the content (Flowerday & Lane, 2012; Flowerday & Shell, 2015).

Second, teacher educators should select a reliable technology platform to host virtual PD. While we chose Zoom because our institution embedded it into our Learning Management System, there are many other options available. We utilized the interactive features in Zoom (e.g., polling, chat, attendee raise hand, breakout rooms) to provide a collaborative and engaging, remote learning environment. We especially liked being able to drop in and out of breakout rooms and the ability to receive a transcript of the chat text to determine PST participation, engagement, and learning.

Third, teacher educators should provide opportunities for PSTs to engage in multiple forms of reflection. Yang (2009) suggests that critical reflection does not come naturally to teachers. A framework, such as the 3-R format shared, can help PSTs structure their reflections. The use of reflection with online discussion boards and in-session chat promotes collaboration and contributes to a professional learning community (Duncan-Howell, 2010). This helped our interns feel connected during this uncertain time, as well as enabled them to draw on a wider range of knowledge and understanding, further fostering the reflective process.

Finally, teacher educators should not underestimate the power of social media to promote reflection and foster collaborative professional conversations. Yang (2009) used blogging, where student teachers' posted messages and comments related to their student teaching experiences as a reflection tool. As evident from GroupMe posts, students used this application without our direction and this proved to be a collaborative, safe space where they could explore and share during this unparalleled time of remote learning.

FUTURE RESEARCH

Given our unexpected success with virtual PD during the COVID-19 pandemic, we will continue to provide opportunities for online professional learning and reflection with future interns. Our faculty is currently working on developing four additional online PD modules to embed into our internship model. Topics will include using visual supports to engage non-verbal learners, using multi-sensory approaches to instruct, teaching children with Cerebral Palsy, and working with children with autism spectrum disorder. These topics were specifically chosen based on our patient population at PedsAcademy and feedback from our interns.

To foster PSTs' motivation and engagement (Flowerday & Lane, 2012; Flowerday & Shell, 2015), we will continue to utilize a "choice board" approach when offering PD opportunities. In addition to asking our interns to submit individual, structured reflections, we will now intentionally encourage the use of the GroupMe application as a reflection tool. Moving forward, we will continue to evaluate PD effectiveness using intern reflections and end-of-the-semester survey results. This data will direct us in making strategic changes to further strengthen our unique, clinical internship model.

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APPENDIX

End-of-the-Semester Survey

Rate the following professional development opportunities you had while at PedsAcademy:

	Not effective	Effective	Highly Effective
Chronic Pain	○	○	○
Oncology	○	○	○
Pulmonary Illnesses & Diseases	○	○	○
Traumatic Brain Injury	○	○	○
BookClub/Litsy	○	○	○
Dash	○	○	○
3-D Printing	○	○	○
Other Coding (Quiver, merge Cube)	○	○	○

How likely are you to implement the following:

	Not likely	Likely	Highly Likely
Chronic Pain	○	○	○
Oncology	○	○	○
Pulmonary Illnesses & Diseases	○	○	○
Traumatic Brain Injury	○	○	○
Book Club/Litsy	○	○	○
Dash	○	○	○
3-D Printing	○	○	○
Other Coding (Quiver, Merge Cube)	○	○	○

Stability Under Pressure:
How a Teacher Educator Sought to Align Beliefs and Practices During a Pandemic

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The global COVID-19 pandemic shattered the plans of many educators. In my classroom, over the span of one weekend, the daily face-to-face classroom interactions vanished, shifting entirely online. As a teacher educator, I have worked to create a student-centered classroom stemming from constructivist-orientated teaching practices. In two days, could I shift my courses online while maintaining a student-centered education environment? I sought to answer this question by permitting my education students' a voice during the transition. Allowing students to participate in the development process transformed my courses. Post-course surveys demonstrate that my preservice teachers' appreciated the continuance of a student-centered environment.

INTRODUCTION

As a Canadian teacher educator seeking to improve my teaching practices, I recently worked to shift from modeling traditional teaching practices (Buttler, 2020) to enacting student-centered, constructivist-orientated practices (Brooks & Brooks, 2001). Learner engagement and classroom climate (Fraser, 2012) are significant instructional considerations in my endeavor to model a constructivist-orientated environment. As the pandemic struck, I was teaching four teacher education courses. Abruptly shifting my education courses online provided a litmus test of my commitment to newly acquired educational beliefs.

The Constructivist Learning Environment Survey (CLES) and the modified CLES illuminate the degree that a classroom's environment is consistent with constructivist epistemology (Johnson & McClure, 2004; Taylor & Fraser, 1991). I concentrated on the Student Negotiation scale of the modified CLES as a basis for examining my course transformation. That is, I focused on the "[e]xtent to which students share with the teacher control for the design and management of learning activities, assessment criteria, and social norms of the classroom" (Johnson & McClure, 2004, p. 68). Allowing for student input, I sought to create stability and thereby provide students an opportunity to regain a sense of control of their educational environment.

INNOVATION

Over a weekend, my courses transitioned from face-to-face to online delivery. Throughout this process, I sought student input regarding the course redesign. Aiming to identify potential issues, I informally interviewed multiple students before they left the campus. The university students identified the style of content delivery, assignment load, and final examinations as their main concerns.

With this initial information, using Google Forms, I created a survey (see appendix) that addressed the students' anxieties and sought specific input regarding the transition online. For example, did the students prefer asynchronous or synchronous lessons?

Following a weekend of data collection and analysis, almost every preservice teacher in each of my courses accepted the invitation to meet virtually (via Zoom) during scheduled class times. 95% of the students completed the survey before our meetings. When the meetings began, anxiety colored the students' faces and altered their voices. Although the

meetings were virtual, my students eagerly discussed the results as they keenly awaited my reaction. As the sessions concluded, I proposed how I would adjust each course based on their feedback. Each proposal was accepted.

The transition online provided a unique educational opportunity. Therefore, during the last virtual class, for each course, I encouraged an examination of our shift online. The preservice teachers unpacked my teaching practices as I laid bare my pedagogical thoughts. Loughran and Berry (2005) describe this as explicit modeling. I encouraged my students to critique my actions, thereby helping them to "'see into practice'— all practice, not just the 'good things we do'" (Loughran & Berry, 2005, p. 200).

For teacher educators who aim to model constructivist-orientated, student-centered practices during a transition online, I suggest the following:

1. Collect student input (Google forms, Survey monkey, etc.), thus identifying their needs while providing students a measure of control. You must use tools that your students can all access and are comfortable using.
2. Meet with the students (Zoom, Google Hangouts, etc.). Present the results of the survey and propose the revised course.
3. Explicitly model your pedagogy. Allow preservice teachers to view the 'wizard behind the curtain.' Discuss why you provided the options you did. Do they agree with you?

Next, follow through with your promises. I am not suggesting that you allow students to recreate your course. However, ensure that the students understand that their input impacted your decisions. In my case, I published the survey results.

RESULTS

As their educational foundation shifted, I sought personally relevant, context-sensitive data from my students. For example, in my Orientation to Teaching course, the first-year education students survey results (in parentheses) and class discussion led to asynchronous classes ($\approx$70%), extended due dates for assignments ($\approx$70%), and a traditional final examination ($\approx$80%).

The students' reactions to the shift online affirmed my conviction to maintain a student-centered classroom. During the first week of transition, I looked for visible indicators of stress. Unsurprisingly, the students displayed many signs of anxiety. Although obstacles stemming from our new model of delivery appeared, little of their concern appeared to stem from the new course format.

In subsequent interactions, the preservice teachers expressed appreciation for the opportunity to provide input regarding their courses. In a post-course survey of my courses administered by the university's administration, 88% of the participants selected strongly agreed or agreed to the statement, "The instructor provided meaningful guidance on my progress/work."

IMPLICATIONS

The urgency of today's educational issues resulting from the COVID-19 pandemic necessitates immediate responses on a worldwide scale. It takes time, knowledge, and resources to develop and deliver optimal online courses. Under current circumstances, these criteria were not met by many educators (Kamenetz, March 19, 2020). Additionally, teacher educators must prepare for the possibility that this pandemic impacts the next school year. Therefore, I suggest that we help our students navigate the transition online by providing them with a sense of control. We can do this by acknowledging the students' concerns and providing them with an opportunity to influence their education.

As I initiated the online delivery of my courses, I felt satisfied. I provided my students with a semblance of control, and I had a clear vision regarding how I would proceed. I should be clear; when I created the student surveys, I only offered possibilities that I felt comfortable accepting. Nevertheless, each group of students opted for unique course delivery. At times, the differences became cumbersome for both the students and myself. The differing expectations led to some confusion on the students' part and required increased attention on my part to ensure that I responded to student inquiries appropriately.

I believe that through the process described above, student engagement allowed for a compassionate transformation of my classes. However, I will supervise field experiences for preservice teachers next semester. Currently, Canadian

K-12 schools are offering face-to-face, online, and blended delivery approaches. If online or blended delivery is required this fall, I will support my preservice teachers in two ways. First, I will work to build the confidence of the preservice teachers entering their field experiences. I will point out the positive aspects of online field experience (Graziano & Feher, 2016). For example, when teaching online, student teachers reported higher parental support and fewer behavioral issues, when compared to the brick and mortar classrooms. Second, my students may be tempted to fall back into lectures and worksheets. I will encourage the preservice teachers to resist this teaching style and engage in student-centered pedagogies. For example, I will suggest using the Buck Institute's collection of resources to sustain project-based learning remotely (https://www.pblworks.org/yes-you-can-facilitate-pbl-remotely) and the National Center for Case Study Teaching in Science's collection of online case studies that support student learning in Science's (https://sciencecases.lib.buffalo.edu/).

There is a significant relationship between readiness and satisfaction when delivering online courses (Adnan, 2018). Unfortunately, students and instructors received little time to prepare for the sudden transition online. In many universities, it fell to the individual educators to facilitate the environment of their courses. Of note, when students are actively involved in making choices, as in a student-centered online learning environment, it is more likely that higher student outcomes will result (McCombs, 2015). Therefore, I suggest that we support our preservice teachers through stressful transitions by providing opportunities for them to regain some control of their educational lives by ensuring that our courses are student-centered.

FUTURE RESEARCH

Perceptions of preservice teachers impact learning (Baran, Canbazoglu Bilici, Albayrak Sari, & Tondeur, 2019). Consequently, I have initiated the collection of post-course qualitative and quantitative data to examine the preservice teachers' perception of the pre-transition survey and the online course delivery. The results will inform how I conduct my future courses, especially if teacher education remains a distant learning affair.

We must keep teaching effectively during times of disruption and transition, yet without a careful examination, we may fall back on traditional pedagogies that benefit instructors more than learners. Knowlton (2000) argues that online classrooms necessitate a student-centered approach. Unfortunately, there is little literature addressing preservice teacher's student-centered online field experiences. Teacher education would benefit from closing this gap.

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APPENDIX

GOOGLE FORM SURVEY

The pre-transition survey questions focused on three areas of interest:

1. <u>Classroom meeting format</u>. Would you like synchronous or asynchronous classes? Synchronous class - Classes will meet at the regularly scheduled time. This type of lesson requires everyone to be online at the same time. Lectures, discussions, and student presentations occur at a specific time. We would meet at Google Hangouts, Zoom, etc. so that we can see each other and can participate in real-time discussions. Asynchronous class – Classes will not be scheduled. I will provide materials, lectures (videos likely embedded in PowerPoint), tests, and assignments that can be accessed at any time.
2. <u>Due dates for assignments</u>. How would you like the due dates for our assignments to be administered? Due dates remain unchanged, are extended by one week, or become due at the end of the semester?
3. <u>Final Exam format</u>. A traditional real-time examination delivered online (time limit 3 hours), a "Take home" (handed out the day before the exam date) due when the final exam is currently scheduled, or a final paper (page count & research requirement to be discussed).

5 Minutes On K-12 Online Learning With… – Advice from Experts to Teachers in the Field

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At present, most teacher preparation programs do not have adequate coverage of how teachers can utilize on-line content and tools to deliver instruction at a distance. This deficit has been partially caused by the reality that faculty in teacher preparation programs have historically not viewed online teaching as real teaching. It has also been caused by a lack of experts in the field of K-12 distance, online, and blended learning; and even fewer resources for teacher preparation programs to rely upon. This inadequacy was highlighted as teachers in jurisdictions all around the world were forced to transition to emergency remote instruction. This chapter describes a project to create a series of short videos interviews with experts in the field to provide in-service teachers with advice and guidance on how to navigate this sudden transition.

Keywords: cyber schooling, e-learning, emergency remote instruction, in-service teachers, K-12 blended learning, K-12 distance education, K-12 online learning, teacher education, teacher preparation programs, virtual schooling

INTRODUCTION

The editors have sufficiently situated the reality that education at all levels has scrambled to figure out how to deliver instruction at a distance due to the global pandemic. While some have differentiated what is currently happening from online education by using the term "remote instruction" (Hodges et al., 2020), the truth is most people – particularly in the general public – do not see a difference. Regardless of terminology, many teachers have found themselves unprepared for the challenges of using online content and tools to provide their students effective and meaningful learning experiences.

An unfortunate reality is this challenge has been foreseen by the field for quite some time. Fifteen years ago Smith et al. (2005) found that only 15% of K-12 teachers have been trained to teach online. More recently, Kennedy and Archambault (2012) found that only 1.3% of the 522 universities surveyed indicated they had some form of field experience related to K-12 online teaching. Four years later, Archambault et al. (2016) replicated that study with a larger sample of 1,017 unique institutions, where responses were received from 363 programs; but only 11% or 40 of those universities indicated they had any focus on K-12 online teaching. In recognition of these shortcomings in formal teacher preparation (and as a blogger focused on K-12 distance, online, and blended learning), I undertook a project designed to provide guidance and a resource for in-service teachers who found themselves teaching remotely without adequate time, planning, or preparation.

INNOVATION

In mid-March 2020 I began reflecting on the media interviews I had completed related to the K-12 education system, emergency remote instruction, and the pandemic. Those reflections led to the conclusion that there were a lot of individuals in the field of K-12 distance, online, and blended learning who had advice based on their years of experience about who to teach and support learning at a distance. Given the reality of the abrupt transition to emergency remote teaching, there was an assumption that most in-service teachers would welcome this kind of advice and guidance – and "5 Minutes On K-12 Online Learning With…" was born.

I began the blog *Virtual School Meanderings* in March 2005, initially on a *Blogger* platform, but that was moved to *WordPress* in February 2008.[1] The purpose of the blog has always been a space for me to play with ideas and post items related to K-12 distance, online, and blended learning. As such, the blog itself had a consistent and steady following,

with entries posted to the blog being viewed somewhere between ~2,000 to ~12,000 times a month or ~20 to ~400 times per day (based on monthly statistics over the past 15 years). One of the features that the blog hosted was a podcast that included both audio and video segments, which made the blog a natural location to post these "5 Minutes On K-12 Online Learning With…" episodes.

Over a six-week period I interviewed 27 individuals in the field of K-12 distance, online, and blended learning. The interviewees included veteran classroom and online teachers, independent evaluators, online school leaders, change agents, government officials, university faculty, and/or researchers – with most interviewees being described in multiple ways. The interviews ranged from 6-18 minutes, were each individual was asked three questions with no follow-ups.

1. Tell me about yourself.
2. There are teachers all around the world who now finding themselves having to use online tools and curriculum for the first time. Do you have any advice for them?
3. We also have parents whose children are learning at home for the first time. Do you have any guidance for them on how to support their child's learning?

The collection of interviews was posted at https://virtualschooling.wordpress.com/5-minutes-on-k-12-online-learning-with/ in an unedited fashion (i.e., the actual interview itself was posted unedited, I did edit the recording only to add a title sequence at the beginning and end of the video) at noon each weekday from 24 March to 30 April.

RESULTS

As this project was designed to create a resource that could be used for teacher professional development, there was no formal thematic analysis of the guidance that this group of veteran K-12 online learning practitioners and researchers provided to in-service teachers. On an informal basis, I would feel comfortable suggesting that the guidance interviewees had for teachers had a great deal of consistency. For example, many of them stressed that teachers (and schools) should focus on 'Maslow before Bloom' – essentially focusing on students' personal and human needs before their learning. Almost everyone stressed the need to just communicate with students – regardless of the medium the teacher uses to re-engage the relationship that they've developed with their students. Additionally, almost all interviewees also mentioned that teachers needed to explore ways to reach students at a distance without relying upon the Internet (i.e., low-tech alternatives to online learning). Further, most mentioned the use of video – both synchronous and asynchronous – and the importance of using it so that students could see you and their classmates. Finally, almost everyone spoke about the need to become comfortable with the technology, which could be accomplished by using tools the teachers were already familiar with and limiting the number of tools the teacher tried.

IMPLICATIONS

As mentioned earlier, this project was designed to create a resource that could be used for with in-service teachers for professional development purposes. As such, there are not traditional implications as there might be if it had been designed as a research project. Upon reflection, one of the reasons I undertook this project was not only due to the lack of focus on K-12 online learning in teacher preparation in general, but also the reality of how few faculty members – both full-time and contingent – exist who have a background in the field. For example, Arnesen et al. (2019) were able to identify 356 journals articles published between 1994 and 2016 written by 384 distinct authors, while Hu et al. (2019) reported there were 123 different authors of the 51 articles published in the first four years of the *Journal of Online Learning Research*. Similarly, there were only 87 distinct authors in both editions of the *Handbook of Research on K-12 Online and Blended Learning* (Ferdig & Kennedy, 2014; Kennedy & Ferdig, 2018). Even if there were no overlap in the authors from these three sources, it would only represent enough faculty to place one at each institution for less than 60% of the teacher education programs identified by Archambault et al. (2016). It is because of this reality that there is a need for resources that feature those who have expertise in the field.

Beyond the scarcity of teacher educators with expertise in the field, there is also general lack of resources available for those who would be interested in incorporating this content into their own teacher education program. During the mid-2000s Iowa State University secured state and federal funding to create "Good Practice to Inform Iowa Learning Online" online teaching cases and "Teacher Education Goes Into Virtual Schooling" online facilitation scenarios (Davis,

Demiraslan, et al., 2007; Davis, Niederhauser, et al., 2005). [2] Personally, as a faculty member at Wayne State University I created Michigan-focused online teaching case studies and online facilitation scenarios (Barbour & Unger, 2014).[3] However, one wonders whether faculty are aware those resources are available. These are just some of the reasons why ad hoc resources that teacher education faculty can incorporate into their own teacher preparation courses, such as the "5 Minutes on K-12 Online Learning With…" videos, are so important for those who have expertise in the K-12 distance, online, and blended learning to create and share openly.

FUTURE RESEARCH

Finally, as the "5 Minutes on K-12 Online Learning With…" videos were not designed as a formal research project, there are not traditional avenues for future research that can be identified by what is missing in the existing data. However, given that the initiative was not a traditional research project also does provide a natural opportunity for future research. At present there are 27 individuals in the field of K-12 distance and online learning that have been interviewed about their perceptions of what was important guidance to provide to both teachers and parents as schools shifted to emergency remote instruction. Transcripts from these interviews could be mined for themes to provide a more systematic guide or plan for these two groups of stakeholders. Similarly, the project was expanded to include another 30 videos focused on advice for school leaders on the end of the 2019-20 school year, as well as the beginning of and throughout the 2020-21 school year. Transcripts from these interviews would also provide a vibrant data set that could be mined for thematic trends.

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[2]   Both of these resources were initially made available online, but are now only sporadically and partially available through the *Internet Archive*. See https://web.archive.org/web/20050208070136/http://projects.educ.iastate.edu/~vhs/ and https://web.archive.org/web/20100627224433/http://ctlt.iastate.edu/~tegivs/TEGIVS/homepage.html.

[3]   The "Michigan Online Teaching Case Studies" are available at http://itlab2.coe.wayne.edu/it6230/casestudies/ and the "Supporting K-12 Online Learning in Michigan" are available at http://itlab2.coe.wayne.edu/it6230/michigan/.

K-16 Educator Professional Development

Throw Me a Lifeline: A Professional Development Program for Teacher Educators Managing the Demands from the Rapid Transition to Online Teaching

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The COVID-19 pandemic has heightened the awareness that teacher educators and teacher candidates need to be prepared to teach in online learning environments. The Teacher Educator Technology Competencies (TETCs) identify the knowledge, skills, and attitudes teacher educators need for preparing teacher candidates to teach with technology. The pandemic has emphasized the critical importance for *all teacher educators* to become proficient with the competencies so they can support *all teacher candidates* in learning to effectively teach with technology, including online learning. This chapter highlights an online professional development program designed to support teacher educators' understanding and application of the TETCs so they, in turn, can assist teacher candidates in becoming competent with technology in their future teaching.

INTRODUCTION

Globally, the COVID-19 pandemic and physical distancing mandated the move to online education. Teachers who had not taught online before were ill-prepared for this fast transition and in too many instances educational experiences were deficient in best practices for online learning. As a result, students will undoubtedly experience limited advancement in learning goals (e.g., Hodges, Moore, Lockee, Trust, & Bond, 2020).

If you are a teacher educator you probably received an email from your Dean, Provost, or President in March, 2020 that read something like this:

Due to physical distancing, the university will switch to virtual instruction for all courses by Monday. This unprecedented situation will be challenging. I encourage you to accept that it *may not be ideal* for all classes and situations.

Then, "the Dean" may have sent a follow-up communication similar to this:

The Provost has announced the implementation of a temporary *Pass/Not Pass* policy, effective immediately and for the remainder of the spring semester.

Under *less-than-ideal* circumstances, many teacher candidates now show *Pass/Not Pass* grades on their transcript for Spring 2020. Where did we go wrong? Could some of the negative consequences have been prevented? If we maintain physical distancing on our campuses during the fall 2020 semester, how will teacher educators prepare themselves between now and then to fully address teacher candidates' learning goals?

INNOVATION

The Teacher Educator Technology Competencies (TETCs) (Foulger, Graziano, Schmidt-Crawford, & Slykhuis, 2017) represent the knowledge, skills, and attitudes of teacher educators who work with teacher candidates as they learn how to use technology in their teaching. In coursework, they represent two learning domains: the practices of teacher educators who effectively integrate technology as well as how course activities are crafted to support teacher candidates' effective use of technology. There are twelve TETCs and related criteria. When combined, the TETCs represent a comprehensive profile for teacher educators' competencies surrounding technology. Of them, TETC 4 and TETC 7 target online teaching and learning. Criteria associated with TETC 4 and TETC 7 include:

- Communicate using online tools (TETC 4a)
- Collaborate using online tools (TETC 4b)
- Design instruction using online tools (TETC 4c)
- Assess teacher candidates using online tools (TETC 4d)
- Model online and blended learning methods and strategies (TETC 7a)
- Provide practice opportunities for teacher candidates to teach online and/or in blended/hybrid learning environments (TETC 7b)

The COVID-19 pandemic required teacher educators to begin immediately teaching online with very little time for professional development to guide them through the transition. Due to ramifications of the pandemic, it is likely that online teaching and learning will become a common approach to teaching on campuses across the world. It is not too late for teacher education programs to adopt a professional development plan.

The online *TETC Professional Development Program (TETC PD Program),* was created specifically for faculty working in teacher preparation programs to help them adopt their teaching practices to better address technology (Slykhuis, Foulger, Graziano, Hofer, Lee, & Schmidt-Crawford, 2020). The program consists of four courses that, when taken together, support teacher educators in attaining the competencies needed to address technology in their courses. Online teaching (TETC 4 and TETC 7) is woven into the course, *Applying Knowledge of Technology to Teacher Education.*

The *TETC PD Program* was modeled after the best practices identified in the *Technology Enhanced Instruction* (TEI) program, a world-wide effort to train faculty in higher education to make better use of technology in their teaching (Hofer, Lee, Slykhuis, & Ptaszynski, 2015; Slykhuis & Lee, 2015). Following the successful framework of the TEI program, participants of the *TETC PD Program* are guided through an iterative, five-step process:

1. Pose an instructional Problem
2. Analyze Your Practice
3. Consider Tools of Enhancing Your Practice
4. Create New Approaches
5. Share Your New Ideas and Revise.

RESULTS

At the time of publication, the *TETC PD Program* had just been launched. Plans are in place to collect empirical data on participants' proficiency with the TETCs including their understanding and application of TETC 4 and TETC 7 that target online teaching and learning. Ideally, from the onset of the pandemic, teacher educators who are adept with technology would have been prepared to move their instruction online in a seamless manner. Such a large reform effort requires a strong commitment from a preparation program - a call for administrative leadership, vision, professional development, and support (Borthwick, Foulger, & Graziano, 2020).

Many teacher educator programs will engage in some sort of 'triage' professional development to prepare for a variety of contingencies that will arise due to the direct and indirect effects of the pandemic. Teacher educator programs that take a longer view and are focused on preparing *all* teacher educators in their program to be competent with technology will be more prepared for any potential interruptions in the future. While everyone hopes there is not another global pandemic, fully technologically competent teacher education faculty would be prepared for interruptions from any circumstance. A competent collective of teacher educators would be prepared to meet any future market demands that call on their technological skills, including teaching online.

IMPLICATIONS

Teacher educators who participate in the four courses of the *TETC PD Program* study all 12 TETCs to help them reflect and identify, within their practice, what the TETCs look like in action. The course, *TETCs 4-7: Applying Knowledge of Technology to Teacher Education*, addresses TETC 4 and TETC 7 regarding online learning in a way that is woven into the bigger objective, to infuse technology throughout a teacher educator's practice.

As teacher educators engage in activities in the *TETC PD Program*, they produce artifacts and revise or re-invent activities that demonstrate competency. For example, when participants study TETC 7 (Teacher educators will use effective strategies for teaching online and/or blended/hybrid learning environments), they use the Community of Inquiry framework developed by Garrison, Anderson, and Archer (2000) to evaluate an online experience in their course. Then they revise the experience by applying the social, cognitive, and teaching presences as defined by the framework.

Similarly, as teacher educators who study TETC 4 (Teacher educators will use online tools to enhance teaching and learning), they review online experiences in their course through a Universal Design for Learning (UDL) lens. This framework helps teacher educators plan for how they might use online resources to promote the principles of UDL: representation, engagement, and/or action and expression (Rose, 2000).

The original purpose of the *TETC PD Program* was to better prepare teacher educators to teach effectively with technology so that they, in turn, could help their teacher candidates be better prepared to use technology in PK-12 classrooms. Teacher candidates are destined to teach in PK-12 schools where teaching and learning practices are forever changing. In their careers, they will be faced with situations where online tools are necessary. As teacher educators become more competent with online teaching through the COVID-19 pandemic experience, they should continue modeling the effective use of online technology for teacher candidates and provide opportunities for teacher candidates to design and teach online. The ultimate goal is that teacher candidates are well prepared to apply technology in powerful ways in their own classrooms (Slykhuis et al., 2020).

The *TETC PD Program* is supported by the Society for Information Technology and Teacher Education (SITE). After successfully completing each course, a certificate is issued from SITE (See http://site.aace.org/tetc/). Administrators could incentivize faculty to participate in the TETC PD by providing release time for faculty to enroll in the program, offering grant money to pay the cost of the program, designating time for faculty who complete the program to discuss their experiences with other faculty via faculty meetings or brown bag luncheons, providing mobile technology to faculty who enroll in the program, incorporating both the TETCs and completion of the program into faculty evaluations for promotion and tenure, and encouraging groups of teacher educators to participate in the *TETC PD Program* together. If teacher education administrators enlist the collective efforts of *all* teacher educators to participate in the Program and re-imagine their coursework while enrolled in the program, they are collectively one step closer to safeguarding their programs from future unexpected interruptions.

FUTURE RESEARCH

One lesson learned from the COVID-19 pandemic is that all educators must be prepared to teach online. In this rapid transition to virtual instruction, most educators were taken off guard in the charge to do their personal best. For continued program success, it would be timely for teacher education leaders to assess where their programs are positioned with regards to: (1) teacher educators' knowledge, skills and attitudes towards technology (i.e., TETCs), (2) the infusion of technology into their programs (Foulger, 2020), and (3) a clear vision of technology's role within teacher preparation.

Future research to address these three areas might involve administering the TETC Survey (Knezek, Christensen & Furuta, 2019) to teacher educators to determine their strengths and professional development needs. Teacher educators could apply a case study approach to examine the application of the TETCs in their teaching (Thomas, Peterson & Abebe, 2019). Finally, teacher education leaders could use the TPACK Leadership Diagnostic Tool (Graziano, Herring, Carpenter, Smaldino & Finsness, 2017) to identify faculty development needs and recognize organizational supports related to technology infusion (Schmidt-Crawford, Lindstrom & Thompson, 2020). Teacher educators who display mastery of the TETCs will be better equipped to teach in the alternate formats that have been dictated by the effects of COVID-19. Teacher educators need to attain the competency with using technology, including the necessary skills to teach online, so they are well prepared to respond quickly to any need for adjustments in their teaching (Slykhuis, Foulger, Graziano, Schmidt-Crawford, Hofer, & Lee, 2019).

The *TETC PD Program* can be accessed at https://tetcpd.thinkific.com/.

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Coaching Novice Inservice University Lecturers:
From Face-To-Face Supervision to Online Video Tagging

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This study reports on the switch from face-to-face coaching sessions - with novice university lecturers on video footage of one of their regular seminars (recorded pre-Covid) - to an online interactive video-enhanced observation (VEO) program. We show how we have used this program and what we have learned from its applications. We conclude that VEO is a suitable and challenging tool for teacher reflection (of both online and offline classes), and we recommend a number of essential observation points.

Keywords: inservice teacher education, teacher reflection, video-enhanced observation, VEO, video tagging, peer review, cross-institutional collaboration.

INTRODUCTION

It is widely accepted that novice teachers benefit from reflecting on aspects of their teaching behaviors as part of their teacher education and professional development (e.g. O'Leary, 2014; Hockly, 2018). Shortly before the Covid-19 shutdown, seminars of six inservice novice lecturers at the Faculty of Humanities of the University of Amsterdam had been recorded for video reflection as part of their University Teaching Qualification (UTQ) trajectory. After the shutdown we, as UTQ teacher trainers, had to find an online alternative to the coaching sessions of the classes that were recorded. Since it has been proposed that watching recordings of their own teaching practice with an online annotation tool may help novice teachers to create an online community of practice and encourage self- and peer reflection (Batlle & Miller 2017; Körkkö et al, 2019), we uploaded the footage to an online portal with a video enhanced observation tool (VEO). In this portal, participants could view, reflect and peer review video footage by tagging features of their own and each other's teaching practice, and supervisors could monitor and comment on tags that were created. Because video tagging as reflection tool is relatively new, we will report on what we experienced and what we learned, and we will make recommendations as to how video annotation can best be implemented in teacher training contexts.

INNOVATION

Video is regarded as a powerful tool to promote reflection, since it addresses issues of cognitive dissonance, i.e. the gap between what novice teachers remember from their classes and what they notice when viewing the video footage (Baecher & Kung, 2011). As such, it is assumed that improvement of observation skills prompts improvement of teaching skills (for overviews of reports on video in teacher education, see Gaudin & Chalies, 2015; Körkkö et al, 2018)

Novice inservice teachers at Dutch universities with permanent or temporary contracts are required to obtain a UTQ. They take a teaching skills course and compile a portfolio, which includes student evaluations and reflections on their teaching practice. As part of their portfolio, one regular (pre-Covid) seminar of each of the six UTQ candidates was video recorded for reflection purposes. When the face-to-face (F2F) feedback sessions (based on these recordings) could no longer take place, the video footage was uploaded to the VEO[1] portal that was developed by the University of Nottingham (cf. Batlle & Miller 2017) after we had taken out licenses[2] for the participants and supervisors. There are similar free video tagging programs, e.g. VideoAnt, but these do not offer the host users the possibility to customize tag sets.

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[1]   https://veo.co.uk/
[2]   300 GBP organization fee + 15 GBP per candidate. Videoant (https://ant.umn.edu/) is a free, open access alternative.

As opposed to the open access tagging programs, VEO not only offers existing tag sets but also allows the host user to create their own tag set to suit the learning objectives. The tag set that we created was:
- Tag at least 2 episodes that you are satisfied with.
- Tag at least 2 episodes that need improving.
- Tag anything that you think stands out for whatever reason.
- For each tag, write your observations and reflections in the notes feature.

When we had uploaded the video footage to the portal, the candidates could access their videos with their individual passwords, watch the footage of their own and each other's teaching, and click on the tags to timestamp the episodes they had selected[3].

We as supervisors could easily access and provide feedback on the tags and notes, since the tool allows the viewer to jump from one selected tag in the video footage to the next. As a peer observation exercise, the candidates were also asked to view each other's videos and tag sets, and comment on the tags their peers had created.

RESULTS

The candidates reported that they experienced the timestamping, tagging and note taking of their own and each other's teaching performance as a very useful pedagogical activity (cf. Batlle & Miller, 2017) and valued the applications of the tool as an alternative to F2F supervision (see also Körkkö et al.**,** 2019). In their tags, however, the candidates mostly commented on general features of their teaching (e.g. the lack of interaction or student participation) but failed to identify the more complex underlying causes (cf. Baecher & Kung, 2011). Our tag set was to blame because our tags were too unspecific; they prompted unspecific reflection. We concluded that viewing the video excerpts with general guidelines does not necessarily result in critical, in-depth observations: novice teachers need supervision and guidance in order to develop critical reflection skills, as will be explained below.

IMPLICATIONS

What we experienced is that a major advantage of digital video tagging tools is that they are time and place independent. Supervisor feedback can be given whenever their busy schedules allow. The clear structure of the tagging procedure makes the activity highly motivating for the student-participants. Also, footage can be shared with peers so as to replace F2F collaborative learning and to create online communities of practice. More importantly, since most teaching is currently taking place online, footage of synchronous digital classes with a recording option (e.g. Zoom) can also be uploaded and tagged in the same way[4].

What we learned is that, with a general tag set, novice teachers tend to reflect on *what* happens as they are observing their teaching practice, but do not have the reflection skills (yet) to determine *why* it happens. In our case, most teachers noticed the lack of interaction with and between the students, but in their comments tended to focus solely on the student roles (e.g. 'the students do not respond to my questions') rather than their own roles. In other words, they did not take the co-construction of interactions in the classrooms into account (e.g. teacher turns leading up to the lack of student response). Although our tag set was not specific enough to alert the teachers to this feature, the timestamps and comments the teachers created did serve as an initial diagnosis of issues and problems that we could draw on to improve our tag set. As such, we learned that, in order to ensure that novice teachers become more critical observers and to achieve alignment between tag sets, critical reflection and learning objectives, novice teachers need more guidance (Blomberg et al, 2014), as will be explained below.

What we recommend*,* based on our experience as described above, is to carefully scaffold the reflection process for novice teachers. Ideally, the participants do two rounds of tagging of the same footage. The first could serve as a diagnostic round by using a general tag set (see under Innovations above). Then, based on the episodes the teachers have time stamped and on the comments they have added in the notes feature, a second, more specific tag set can be created that will send the participants back to the same footage with a different, more specific focus. Needless to say, based on their

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3   See Appendix A for the assignment and specific instructions.

4   See Appendix A.

particular contexts and objectives, teacher educators may also decide to do one round of tagging only and create a specific tag set from the onset.

In our case, since our participants mostly commented on the interactional dimensions of their teaching (or rather, the lack thereof), we have designed a tag set consisting of the following eight tags that zero in on the role of teacher turns and decisions in the discursive construction of classroom discourse:

- Feedback and correction[5]
- Questions
- Calling on students
- Instructions
- Non-verbal/paralinguistic communication
- Contextualization cues
- Work forms
- Opening and closing

Although we have not had a chance to work with this improved tag set, we hypothesize that a specified tag set like the above will invite a more focused and specified response; we expect these tags to serve as a scaffolding tool and viewer's guide (cf. Baecher & Kung, 2011; Blomberg et al, 2014) that will direct the participants to reflect on episodes of their teaching from a more complex and detailed perspective, which will ultimately make them more analytical observers and better teachers.

FUTURE RESEARCH

To test our hypothesis, as a follow-up assignment[6] we will ask the same group of participants to go back to their (and each other's) footage with the adjusted and modified tag set we designed, to encourage better observation skills and enhanced learning outcomes. It would also be worthwhile to explore the options of projects where video footage and tag sets can be shared, explored and analysed in cross-institutional and cross-national collaboration.

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[5]   See Appendix B for the parameters of each of the tags (as part of the follow-up assignment).

[6]   See Appendix B

APPENDIX A

ASSIGNMENT

Assignment
1. Reflect on and tag your own video (this video could also be a recording of a class that was taught online):

Watch the footage of your seminar on VEO. Use the tags to timestamp and comment on a specific episode. Create a minimum of 6 tags:
- at least 2 episodes that you are satisfied with.
- at least 2 episodes that need improving.
- at least 2 episodes that stand out for whatever reason.

For each tag, write your observations and reflections in the notes feature.
2. Peer review:

Watch the footage of the peer that has been assigned to you by your supervisor. View the tags they have created (you can jump from one tag to the next), and write your comments in the notes section of each tag.

Instructions:
- Go to https://veo-group.com/ and log on.
- Go to the UTQ group that has been created and click on the video with your name.
- Click on the *tagset* in the right column. Click on the *dropdown menu* and select UTC. Click *OK*.
- Skip *pre-tagging* (by clicking on *continue*).
- Start the video. Click on the + or – tag: in the right column a notes window will pop up where you can add your comments.
- At the end of your session, click *submit tags*.

FOLLOW-UP ASSIGNMENT

Assignment
1. Self-reflection: Go back to the footage of your teaching and focus on the episodes you selected for the first tag session. Start a new tag session (see the 8 different tags below). Create a minimum of 16 tags (if applicable, try to use all the tags at least twice).

Parameters of the tag set:
*   Feedback and correction:
    o   Reflect on your reaction to student answers that are correct.
    o   Reflect on your reaction to student answers that are incorrect.
*   Questions
    o   Reflect on the types(s) of questions you ask (e.g. display questions, discussion questions, etc.).
*   Calling on students
    o   Reflect on if and how you call on students (e.g. calling on individual students, self-selecting, etc).
*   Instructions
    o   Reflect on how you give instructions.
*   Non-verbal/paralinguistic communication
    o   Reflect on your non-verbal communication, e.g. body language, position in the classroom; mimicry, gestures, etc.
    o   Reflect on your paralinguistic communication, e.g. using fillers (*uhmmm*), prosody, etc.
*   Contextualization cues
    o   Reflect on whether and how you indicate transitions (e.g. from frontal teaching to working in pairs; from one topic on the agenda to the next) during your seminar.
*   Work forms
    o   Reflect on your teaching methods, e.g. frontal, teacher-led, working in pairs/groups, student presentations, etc.
*   Opening and closing
    o   Reflect on how you start and wrap up your class.

2. Peer review:

Watch the footage of the peer that has been assigned to you by your supervisor. View the tags they have created (you can jump from one tag to the next), and write your comments in the notes section of each tag.

Instructions:
*   Go to https://veo-group.com/ and log on.
*   Go to the UTQ group that has been created and click on the video with your name.
*   Click on the *tagset* in the right column. Click on the *dropdown menu* and select UTC2. Click *OK*.
*   Skip *pre-tagging* (by clicking on *continue*).
*   Start the video. Click on the + or – tag: in the right column a notes window will pop up where you can add your comments.
*   At the end of your session, click *submit tags*.

Facilitating Just-in-Time Professional Development for Inservice Teachers Transitioning to Distance Learning

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The evolving needs of teachers during the unexpected COVID-19 transition to distance learning provided opportunities for just-in-time professional development that was not only responsive to teachers' emergent needs but also facilitated by teacher leaders. This article describes the just-in-time professional development offered to teachers in a rural district in the Pacific Northwest. What started as a subject-matter expert curating a playlist of videos for a teacher leader to share with teachers in the district resulted in over 100 views and 15 hours of watch time within the first week. The dissemination of the playlist led to requests for additional professional development resources, which were curated by the SME, compiled in a single location, and made available to teachers in the district. The results suggest that effective just-in-time professional development should respond to teacher-expressed needs and a teacher leader's abilities with technology integration may not be as important as their abilities as a teacher leader.

INTRODUCTION

The unexpected, immediate transition from brick-and-mortar to distance and online learning during the COVID-19 pandemic left K-12 teachers in a rural district in the Pacific Northwest scrambling to learn how to teach online. While the considerations for online learning are different than blending learning, the lack of technology integration professional development (PD) offered by the district compounded the problems experienced by some teachers, leaving most with questions and concerns about how to deliver online instruction. The evolving needs of teachers from this district provided opportunities for just-in-time PD that was not only responsive to teachers' emergent needs but also facilitated by a teacher leader.

Just-in-Time PD

Just-in-time PD is informal PD that offers teachers ongoing support when they need it most (Jones & Dexter, 2014). It provides teachers access to PD that is flexible and responsive to their needs and can be accessed anytime and from anywhere (Jones & Dexter, 2014; Lock, 2006). Unlike PD planned for a specific purpose and audience, teachers take the initiative to find subject-matter experts (SMEs) that can support specific needs (Greenhalgh & Koehler, 2017).

Teacher Leaders

Responding to the emergent needs of teachers during the COVID-19 pandemic must employ all teacher leaders – not just technology teacher leaders – who are willing to facilitate online learning PD. York-Barr and Duke (2004) described

three characteristics of teacher leaders – they are respected as teachers, have an orientation for learning, and are capable of influencing and improving others' teaching practices, which can positively affect student learning.

INNOVATION

The second author, who serves as the union co-president for the district and will be referred to as the teacher leader, listened to district teachers' needs and concerns for the transition to distance learning. The district's delayed and surface-level support of teachers' use of instructional technologies led the teacher leader to seek the support of the first author, a SME who used to teach in the district. It should be noted that just-in-time technology PD is distinctly different from planned and/or ongoing technology PD as it is informal and can be accessed anywhere and at any time (Jones & Dexter, 2014; Lock, 2006).

The just-in-time PD began by addressing teachers' specific concerns about using Google Classroom to deliver online instruction. The SME curated an unlisted YouTube playlist of six videos that covered the basics of Google Classroom, and the teacher leader shared the playlist with district teachers. After receiving the playlist, teachers requested PD resources for 10 additional tools that were recommended by the district or fellow teachers. The SME compiled PD resources for each of the requested tools in an effort to meet teachers where they were to facilitate understanding of how to use specific tools for instructional purposes rather than advocating for specific instructional and/or technological strategies or ideas. The SME compiled PD resources for requested tools (e.g., video playlists, help pages, picture tutorials) and provided access to frequently used tools provided by the district (e.g., Gmail, Drive) in a single location using Symbaloo (see Figure 1). Each tool's PD resources were consolidated into groups, which can be expanded by selecting the four squares in the top, left corner of the tool's group (see Figure 2).

After emailing the link to the Symbaloo, additional data was collected via an electronic communication received by the teacher leader and a survey sent to district teachers six weeks into distance learning; the survey asked teachers to describe their use of resources shared on the Symbaloo (e.g., did they use the shared resources?, did they find their own resources?, did they not use any resources? did they not use any resources because they already knew how to use the tool?). Additionally, teachers were asked about their interest in participating in sustained PD sessions about integrating technology into their instruction.

Figure 1. PD Resources Consolidated in Groups and Compiled in Symbaloo. The resources are accessible at justintimepd.symbaloo.com.

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Figure 2. Expanded Group of PD Resources.

RESULTS

Within one week, playback of the playlist was initiated 121 times, resulting in 15.2 hours of viewing. The two most frequently viewed videos were about usage tips and assigning work. On average, teachers watched for 7 minutes and 33 seconds. Of the 225 teachers in the district, over half (55%, n = 124) responded to the survey during week six of distance learning. Seventy percent of teachers who responded to the survey indicated using resources provided to learn about at least one of the tools.

Over one-half of respondents s (n = 57) used the resources shared to learn how to use Google Classroom. Of the resources provided for the 10 additional tools on the Symbaloo, 31% (n = 38) of teacher respondents indicated that they used the resources to learn how to use Loom. The two additional tool resources that were most frequently used by teachers were Screencastify (14%, n = 17) and Google Forms (12%, n =15). Additionally, 91% of teachers indicated that they were interested in participating in sustained professional technology integration professional development, and some (12%, n = 10) described their use of and abilities with other tools.

IMPLICATIONS

The results of this study suggest several important implications for inservice teacher professional development. When using a teacher leader to facilitate PD, the leader's abilities with technology integration may not be as important as their abilities as a teacher leader. Teacher leaders who are willing to do whatever they can should be viewed as assets who can help facilitate just-in-time PD for teachers in their districts and PLNs. While the teacher leader in this study did not consider herself an expert in online teaching or technology integration, she was able to leverage her position as the union co-president to provide just-in-time PD resources for teachers in her district.

Another implication suggests that the success of just-in-time PD may be an effect of listening to teachers' needs and curating resources that met them where they were to facilitate understanding of how to use specific tools for instructional purposes. Not only was the teacher leader in this study able to leverage her position to share teachers' expressed needs with the SME, but also she used the curated resources to learn how to use tools and met with the SME to ask questions

and discuss instructional ideas. As a result, teachers felt supported and heard as they individually started to overcome initial barriers of learning to teach online. Teachers also started expressing a desire for sustained technology integration PD in the future that focuses on instructional approaches and strategies that lend themselves to both blended and online teaching.

In the context of teacher leaders, the work of technology teacher leaders does not go unnoticed by peers and may lead to teachers' realization of their teacher identities. Through conversations with peers and responses to district-wide surveys, some teachers (12%) in the district have new confidence in their abilities to integrate technology and have started identifying as technology teacher leaders who may have knowledge that could support their peers. Sugar and Warren (2003) suggested that district administrators recognize teachers as both designers and leaders when integrating technology in their classrooms.

The results of this study suggest the importance of compiling just-in-time PD materials in a single location. While just-in-time PD is characterized as flexible and can be accessed from anywhere (Jones & Dexter, 2014; Lock, 2006), much of it studied in the context of social media platforms, which prohibits understanding of the challenges experienced by teachers seeking just-in-time PD resources (Greenhalgh & Koehler, 2017). The main curation tools used to facilitate just-in-time PD and compile resources in a single location in this study were YouTube and Symbaloo. The SME used YouTube to develop playlists of instructional videos and Symbaloo to compile everything in a single location that could be shared via a link, updated, and embedded on the union's website, which helped reduce the number of barriers needed to learn how to use a tool for instructional purposes. Instead of Symbaloo, others could curate PD resources using Blendspace by tes, any free website builder, Google Docs, or Microsoft Word online.

FUTURE RESEARCH

To successfully replicate this in other contexts, it is important to develop PD that meets teachers' needs without promoting instructional ideas or tools teachers are not ready for. Once teachers become comfortable with designing and developing content for distance learning, they will begin asking about additional tools that can meet their instructional needs and solve their instructional problems. To provide a better understanding of the contextual factors related to requests for PD about specific tools, future research should record and analyze these requests by teachers' grade level and content area. Because teachers may begin recognizing peers or identifying themselves as technology teacher leaders who can offer substantive PD opportunities for other teachers in the district, future research also should investigate the circumstances that lead to a teacher's identity as a technology teacher leader. Finally, Kopcha et al. (2020) suggested investigating the 'how' and 'why' behind a teacher's decision to use technology in an attempt to better understand the development of a teacher's repertoire as it pertains to integrating technology. To better understand how a teacher's technology-integration identity and repertoire develop, scholars should investigate the decision-making process of technology teacher leaders to determine if and how their work can be applied to other groups of technology-using teachers.

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Multilevel Approach to Professional Development for Teaching During School Closure

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This paper describes how an in-service school-university partnership (SUP) innovation Network in Hong Kong modified its teacher professional development program in order to address the challenges of school closure during COVID-19. The SUP network is a joint-school network with a mission to support scalable STEM pedagogical innovations in schools with self-directed learning as the pedagogy of choice. The school closure disrupted the network's original schedule of monthly workshops, which provides professional learning and networking opportunities. This also threatens the achievement of the targeted network goals. The University support team adopted a layered, multilevel approach that addressed in sequence: challenges faced by teachers in implementing pedagogical sound online teaching and learning (T&L) practices, school-level strategies for building sustainable online T&L capacity, and the design and implementation of interactive online STEM learning activities. Some initial success in re-establishing the learning community through the application of this layered multilevel approach is reported.

INTRODUCTION

Until the COVID-19 outbreak, the use of digital technology for learning played only a small role in Hong Kong classrooms (Reichert, et al., 2020). How could the Network sustain the learning community and continue to support teachers when place-based Network meetings, consultation visits and classroom observations were no longer possible?

The SUP Network adopted design-based implementation research (Fishman, Penuel, Allen, Cheng & Sabelli, 2013) as its methodological approach, and the MultiLevel-MultiScale (MLMS) framework (Law, Niederhauser, Christensen, Shear, 2016) as its design principles. The MLMS framework highlights that if a learning innovation is to achieve scalability (Clarke & Dede, 2009), it needs to address learning issues at both classroom and school leadership levels. This can be achieved through the design of an appropriate architecture for learning comprising organizational structures, interaction mechanisms and mediating artifacts (Law, Yuen & Lee, 2015). The MLMS framework underpins the design of the layered multilevel approach in the revised professional learning and support plan.

INNOVATION

Learning at different levels is needed for innovation and change, and the learning is interdependent (Law, et al., 2016). For pervasive online learning implementation to be effective, the multilevel learning needs are as follows:

(a) At the teacher level, knowledge and skills about online learning technologies suited to different pedagogical approaches and designs.
(b) At the school level, strategies to build the capacity (infrastructure and organizational) for online teaching and learning.
(c) At the Network level, building knowledge communities to share experiences about practices and innovations that work.

We aligned these learning needs with long term goals of e-learning and STEM education since the ability of implementing pedagogically sound online teaching and learning (T&L) becomes the fundamental competence for teachers to be able to conduct SDL-STEM lessons online.

Learning conditions for the network communities were facilitated by learning architectures (Law et al., 2015) with online professional development (PD) as interaction mechanisms. Layers of PD were designed at the teacher, school and network levels with interdependent learning focuses (Law, et al., 2016). The design of the three layers was principled by peer learning and agencies of Network members. The first layer was at the teacher level, responding to the imminent learning need of online technology and pedagogy. The second layer was across both school and network levels, facilitating Network pioneering school leaders to share challenges and roadmaps for online learning to inform subsequent strategies. The third layer addressed school-level strategies with a school's successful experience of engaging teachers and students in online learning for sustainable development during the school closure period. When schools and teachers were accustomed to online PD, the fourth layer was designed as a series of STEM workshops, focusing on designing STEM curriculum topics with online activities that foster self-directed learning. At the time of writing, the Network has reached the stage of being ready for setting subsequent implementation.

Reification artifact as a component of learning architecture (Law et al., 2015) was used to facilitate learning in and beyond the network community. Teachers' and school leaders' sharing in online PD has contextual richness, but not the systematic design principles for easy understanding and adoption by others. At the network level, a website (https://elearning.cite.hku.hk) about online learning was designed to abstract the key design ideas underpinning practitioners' sharing. The website facilitates peripheral participation (Wenger, 1999) through asynchronous online learning in the Network.

The above layered multilevel approach is summarized in table 1.

Table 1
Layered multilevel approach to designing learning for Network communities

	Identify learning needs	Learning conditions with layers of professional development activities at different levels and artifacts			
Teacher Level	knowledge and skills about online learning technologies suited to different pedagogical approaches and designs	**Layer 1** *Pedagogically guided online learning and teaching basics*			**Layer 4** *STEM Workshop series—Designing online STEM activities with self-directed learning*
School level	strategies to build the capacity (infrastructure and organizational) for online teaching and learning		**Layer 2** *Sharing of challenges and roadmap for online learning with Network school leaders*	**Layer 3** *School-level strategies of building sustainable online learning*	
Network level	building knowledge communities to share experiences about practices and innovations that work			**Artifacts** — *Website for online learning with good practices*	becoming ready for subsequent implementation of STEM education

RESULTS

To evaluate schools' engagement in the SUP network, we compared the data on their participation for online STEM workshops with place-based workshops right before COVID-19. We found that schools' engagement, as measured by the percentage of Network schools participating in at least one PD remained constant at 78%. Majority of Network schools were able to engage in our STEM workshops though the number of participating schools were slightly lower than that before school closures. The school closure from late January caused disruptions of original network mechanisms for STEM implementation as well as school routines. These disruptions posed threats of breaking down the learning community in the network. The layered multilevel approach has re-engaged most Network schools' teachers in the learning community for designing STEM education both online and at schools for the long run.

Table 2
School engagement before and after school closure

Professional development	Place-based PD		Online PD during school closures				
	STEM Workshop series in Dec	STEM Workshop series in Jan	Layer 1	Layer 2	Layer 3	STEM workshop series I	STEM workshop series II
No. of schools	**31(63%)**	**32 (65%)**	26 (53%)	8 (100%) *by invitation	20 (41%)	**26 (53%)**	**29 (59%)**
No. of schools joined at least one PD	**38 (78%)**		**38 (78%)**				
Total no. of Network schools			49				

IMPLICATIONS

The social distancing measures have caused challenges not only on the continuity of learning but also the continuity of learning communities for teachers and schools. The design of the PD programs must be learner-centered and community-centered (Bransford, Brown & Cocking, 2000). Guided by the MultiLevel-MultiScale (MLMS) framework, the learning community was able to get-back-together through addressing emerging learning needs at teacher, school leadership and network levels with layered PD. In the process, teachers and school leaders were enabled to have their agencies in the network and peripheral participation was accommodated (Wenger, 1999).

The layered multilevel approach offers a way for rebuilding existing learning communities amid disruptions of accustomed networking mechanisms. The rebuilding process echoes parts of Wenger's (2009) development stages for communities of practice. We conceptualize the rebuilding process in three stages: potential, coalescing and re-activating. The design framework for rebuilding learning communities is illustrated in table 3.

Table 3
Framework for rebuilding learning communities

	Development Stages for re-building learning communities		
	Potential	**re-coalescing**	**re-activating**
Teacher Level	Identify and align emerging needs with long term goals	Create learning mechanisms and artifacts with layers of professional development activities addressing learning needs at different levels	
School level			
Network level			

The rebuilding process might be applicable to other situations with learning communities relying on physical meetings before. We consolidate key strategies in each development stage.

(1) In the potential stage, practitioners at each level work for emerging needs without sharing practices (Wenger, 2009). Making alignment of learning needs at multiple levels with long term developmental goals is needed so that the design of PD is informed by learners' needs (Bransford, et al., 2000) and laden with the value of sustainable development.

(2) In the re-coalescing stage, practitioners are enabled to share their emerging practices. There are three key strategies in this stage: (i) the identification of pioneering teachers and schools as expert members in the community (Wenger, 1999); (ii) the provision of learning mechanisms at multiple levels (Law, et al., 2016); (iii) making use of reification artifacts (Law, et al., 2015) for recognizing members' contributions and facilitating peripheral participation (Wenger, 1999).

(3) In the reactivating stage, network members adapt to change and re-engage in learning and developing good practices in response to the original goal of the network. There are two key strategies: (i) aligning learning interests of online teaching with the provision of interactive online STEM learning experience; (ii) connecting the learning content with the immediate real life issues in relation to the pandemic, in line with the crux of STEM education (Johnson, Peters-Burton,& Moore, 2016).

FUTURE RESEARCH

Apart from the online PD programs, we have been consistently connecting with Network schools via phone calls, WhatsApp, emails and online co-planning meetings. Some teachers have engaged in designing online STEM learning activities for students. We will further investigate the influence of online PD on teachers in designing STEM activities mediated by online means and monitor the subsequent development of the learning community in the school network.

For us, the conceptualization of development stages for re-building learning communities is a hindsight. The design framework (table 3) might be adopted in design-based implementation research for re-building learning communities. We defined a re-activating stage of getting back on track before the maturing stage in Wenger's (2009) model. Further research on the trajectory of rebuilding learning communities is called for.

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Leveraging Virtually-Mediated PD to Meet the Emotional Needs of Preservice Teachers in the Age of COVID-19

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The onslaught of COVID-19 disrupted many of the basic assumptions that frame the student teaching experience. Student teachers are now transitioning from face-to-face K12 experiences to online teaching, and facing growing uncertainties, as they prepare for graduation and their futures as teachers. The culminating effect of these transitions and uncertainties is increased anxieties and emotional distress, as student teachers process the impact of COVID-19 personally, academically and professionally. This paper outlines the process by which our university leveraged their virtually-mediated PD model to address the affective impact of COVID-19 on its student teachers.

RATIONALE

With approximately 70% of its student teachers completing their internships at a distance, our teacher education program transitioned its traditional face-to-face PD (PD) model to a virtual platform, offering student teachers meaningful PD through real-time interaction with faculty, as well as asynchronous access to content. While there is a growing body of literature that demonstrates the impacts of Virtually-Mediated PD (V-MPD) on preservice teachers' pedagogical growth (Chandler, 2004; Firestone & Rodl, 2020; Hou, 2015; Kennedy, Kellems, Thomas, & Newton, 2015), the wake of COVID-19 highlights the need for further research on how V-MPD may be used to address the emotional well-being and needs of student teachers (Hawkey, 2006). This paper seeks to outline how we planned and shifted the purpose of V-MPD to reflect the affective impact of COVID-19 on our student teachers.

INNOVATION

Our PD Schools (PDS) liaisons (author), in collaboration with the Coordinator of Field Experiences (author), **design and host** our V-MPD for our student teachers: a 30-minute, weekly PD live show, *EdLive.* Aligned with Mayer's (2005) Cognitive Theory of Multimedia Learning (CTML), the development of *EdLive* requires that we: **"select[s] relevant material"** by addressing student-teachers' pedagogical concerns (i.e. classroom management, planning, assessment, etc.); **"organize[s] selected material"** into an engaging "talk show format" that features conversations with guests rather than lectures; **"integrate[s] selected material with existing knowledge"** by encouraging interactions with student-teachers via chat features (p.37). The 30-minute time-frame requires intentional organization of material that capitalizes on the limited time people have to process information (Mayer, 2005, p.35; Kennedy et al., 2015, p.165). The format engages "active processing," and focuses on creating an engaging environment where material is presented in a fashion that promotes active learning (Mayer, 2005; Wittrock, 1989).

In order to make the most of the 30-minute format, we utilize a similar format for all shows. Guests appear weekly in a talk show style format (see figure 1). For the purposes of the show, this format includes: introducing guests and topics; engaging in an interview process where questions frame the structure and continuity of the content; and answering questions from student teachers before signing off. We utilize "lower third graphics" and displays to enhance the content of the show. The hosts address questions in the chat feed, which is projected on large monitors.

Figure 1. Studio Version *EdLive.*

COVID-19 disrupted many of the basic assumptions that frame the student teaching experience and future employment prospects. *EdLive* pivoted away from pedagogical concerns to address the immediate emotional needs and growing anxieties of our student teachers. The design of the show was integral in making this shift: 1) the live-streaming platform facilitated quick dissemination of critical information; 2) the interactive nature of the show allowed for integrated interaction with hosts; 3) the hosts' empathetic demeanors encouraged student-teachers to share their questions and concerns.

The first episode after COVID-19 went live shortly before the shutdown of all the state's public-school buildings. These two converging events added urgency to their questions, which were documented in the chat feature: i.e. "Will I still graduate? How will I support my cooperating teacher? Will I receive my teaching license?" In person guests shifted to virtual guests through video/audio conferencing (see figure 2), still providing the content and support our student teachers were seeking.
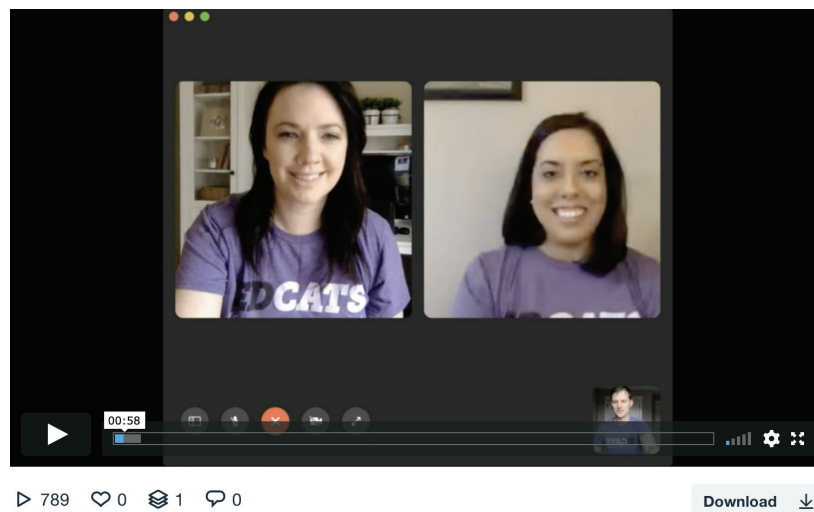
Figure 2. Post-COVID *EdLive.*

We prioritized their needs within the context of their mental and physical well-being. We created a Q&A handout from the questions posed in the chat, offering more information pertaining to licensure and graduation. Additionally, we addressed protocols for if/when they should return to face-to-face instruction and how to support their cooperating teachers, as they transition to alternative forms of education. Subsequent episodes continued to prioritize student teachers' evolving needs, helping them "retain a sense of control and remain resilient" in the face of adversity (Bieler, 2013, p. 24).

EARLY RESULTS

While anecdotal, findings suggest a live-streaming, virtual platform offers a viable medium for ongoing PD addressing the emotional needs and well-being of preservice teachers. Following the show, several student teachers thanked us for easing their concerns. In a follow-up interview with one student teacher, Lauren Smith offered the following reflection:

> ... At first, the meetings covered topics about which many of my fellow student teachers were anxious: portfolios, classroom management, and assessment. [When] school buildings were closed..., they became a lifeline. EdLive hosted guests who had answers. [A professor] walked interns through adaptations in our portfolio. [A faculty member] coached us on Zoom interviewing. [A teacher] shared how this transition to online learning looks for her classroom. Every week, we had an open line to a community… that helped us maintain an authentic fellowship during a socially-distant crisis …

Smith echoes the needs of many student teachers. Initial feedback suggests that our V-MPD has been effective, addressing their emotional and pedagogical needs.

IMPLICATIONS

COVID-19 has demonstrated how valuable it is to have a V-MPD system in place that keeps us connected to our student teachers, and that encourages them to engage in ongoing learning. While our program utilizes a commercial platform for live-streaming, an institution wanting to replicate the show's format may do so using open-access products such as Facebook Live, YouTube and Zoom. Such platforms allow for synchronous delivery of content and viewer interaction. For other teacher education programs seeking to replicate this model, we offer the following recommendations based on what we've learned in creating *EdLive*:

> ● **Needs Assessment:** Needs assessment offers teacher education programs insight into their student teachers' pedagogical, emotional and technological needs, thus allowing them to construct PD that can lead to changes in practice (Grant, 2002). Furthermore, it is important to recognize what preservice teachers find valuable at different points in their student teaching experience and beyond (Shoyer & Leshem, 2016). In our case, we gathered their needs post COVID-19 through emails; however, a more formal survey may provide a longitudinal and holistic perspective of their professional concerns. The feedback we've received indicates that their concerns range from the immediate (e.g. program requirements, due dates, etc.) to the long-term (e.g. classroom management, interviewing, licensure, etc.). We create content that aligns to these concerns.

> ● **Reflective Personnel:** A consistent and committed team is vital in planning and delivering V-MPD, including communicating with students, confirming guests, and producing and disseminating the PD. Central to this commitment is recruiting faculty that embrace ongoing reflection in order to actively change the nature of V-MPD to better meet their students' needs (LoCassele-Crouch, Davis & Weins, 2012). We reflected upon the best way to address their concerns, and constructed a path forward "from the materials of [a] problematic situation" to address how we would forge forward amidst school closures, uncertain health and life changes, etc. (Schön, 1983, p.39). Reflection was ongoing as we listened to our student-teachers, and created episodes directly aligned to what they needed most.

> ● **Development of Engaging and Relevant Content:** Production value is important in engaging students in V-MPD, as it aligns the medium (virtual live-streaming) with active and meaningful participation (Bredeson, 2002). When conceptualizing *EdLive*, we met with our Information Technology (IT) department to ensure that our vision for virtual PD could be supported within our existing infrastructure. Since our live-streaming platform is web-based, we were able to create PD that was supported in any setting. This collaboration ensured quality audio and visual presentation of the content, as well as ongoing interaction from our student teachers.

Content that is relevant, and "grounded in empirical evidence" is foundational to PD, whether delivered face-to-face or virtually (Kennedy et al., 2012). As part of our community of practice (Hou, 2015), our featured guests, which include practicing teachers and faculty, help student teachers merge theory and practice in reflexive ways. Our initial feedback suggests that student teachers appreciate listening to the experiences of in-practice teachers. Thus, one change we intend to make to the show is a "Stories from the Field" segment which will feature the experiences of practicing teachers. Ad-

ditionally, we plan to invite former student teachers to share their perspectives on the student teaching experience and beyond.

Ultimately, our experiences with COVID-19 has solidified a critical lesson: V-MPD must be driven by both emotional and pedagogical needs of our student teachers.

FUTURE RESEARCH

Our preliminary findings affirm the exigency for teacher preparation programs to be aware and responsive of their student teachers' emotional well-being. Furthermore, our experience with *EdLive* indicates that V-MPD offers a viable platform for prioritizing the affective needs of student teachers. Yet, further research is needed in addressing best practices in undertaking emotional concerns as a part of ongoing V-MPD. Furthermore, given the novelty of COVID-19, and how little is known about its long-term ramifications on K-12 schools and teacher preparation programs, longitudinal studies needed to better understand the depth and breadth of the emotional impact COVID-19 has had on our student teachers. These research efforts will be vital in constructing V-MPD models, such as *EdLive*, that offer meaningful pedagogical and emotional support.

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Building-Level Teacher-Experts as a Professional Development Support for a Multiple Access Point Strategy During Distance Learning

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A rural, high poverty, public school district in Idaho used a multiple access point strategy, focused on leveraging building-level teacher-experts as internal professional support for the equitable implementation of distance learning during the COVID-19 school closures. Early results indicate the use of building-level teacher-experts as a professional development strategy has increased teacher comfort levels with using various technology devices and platforms during distance learning. These results may be used by leaders to inform and formalize targeted professional development opportunities for in-service teachers as districts navigate the possibility of distance learning in the future._

INTRODUCTION

School closures and a national movement towards distance learning during the COVID-19 pandemic surfaced the need for in-service teacher professional development targeting the equitable implementation of educational technology (Steele et al., 2017; Tawfik, Reeves, & Stich, 2016). Based on past research, as teachers integrate new technology into their classrooms, especially when they lack experience and confidence with the tools, targeted professional development based on a clear vision is necessary for overcoming challenges (Anderson, 2020; Phirangee, 2013; Ramadan, 2017; Vrasidas, 2015). For a high poverty district in Idaho, the use of building-level teacher-experts served as a catalyst for addressing equity issues by providing targeted professional development on multiple access points to educational technology for in-service teachers. This organically-developed strategy may be replicated in other districts by leveraging building-level networks and professional learning communities focused on targeted professional development and mentorship.
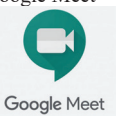
INNOVATION

While in-service teachers implemented distance learning, they relied on pre-existing relationships with building-level teacher-experts (full-time classroom teachers with a passion for technology) as professional support for implementing educational technology. These teacher-experts served informally in a dual capacity, as embedded professional learning community (PLC) leaders and as a "coach-on-call."

In PLCs, building-level teacher-experts led informal professional development for in-service teachers on implementing a multiple access point strategy to meet students' diverse device access and experiential needs. With the district strongly recommending the use of the Google Suite platform for distance learning, teacher-experts identified gaps in teacher understanding of the platform by informally polling (see Appendix A) teachers during their weekly PLC meetings. Via these conversations, the teacher-experts identified priority needs for implementing the functionality of the Google program (Bendici, 2020), like how to use Google Meets to hold a synchronous class meeting, and then provided targeted learning opportunities during PLCs and one-on-one meetings to address those needs. For example, after being

part of these focused professional learning opportunities, educators were able to participate in and run their own Google Meets using Chrome extensions like GridView and MeetAttendance (see Table 1). Teachers also learned how to successfully incorporate highly engaging instructional tools, like Kahoot, NearPod, PearDeck, JamBoard, Screencastify, and Mote, into this synchronous digital space (see Table 1). After teachers were comfortable with these integrations, teacher-experts shifted conversations to the multiple access point strategy by focusing on the equitable facilitation of learning via the Google platform on devices beyond laptops, like cellphones, tablets, and Xbox One and PlayStation4 consoles. This priority shift allowed teachers to further meet students' diverse device access and experiential needs. In this informal leadership capacity, the use of teacher-experts allowed for targeted distance learning support while addressing equity issues through the multiple access points strategy.

Table 1
Digital Tools Suggested by Building Level Experts for Use During Distance Learning

Digital Tool	URL	Features of Program	Uses During Distance Learning
Google Meet	https://meet.google.com/	• Host live meetings with video and audio • Can host up to 250 people in a Meet	• Allowed teachers to teach live lessons or review sessions for both new and review content • Allowed teachers to hold weekly check-ins with groups of students (scavenger hunts, talent shows, etc.) and to check-in with building level experts
GridView Google Meet Extension	https://bit.ly/3bLtyu9	• Transforms Google Meet screen into a gallery view format so all participants are visible at once • Highlight speaker with green box	• Allowed for nonverbal communication by being able to see all students at once during a Google Meet • Allowed teachers and students to maintain interpersonal relationships • Allowed teachers to take screenshots after hiding student names
MeetAttendance Meet Extension	https://bit.ly/36dqqGj	• Takes time-stamped attendance in Google Meet • Saves in Google Drive	• Allowed teachers to quickly capture attendance in a Google Sheet during a Google Meet • Allowed teachers to record student contacts during Google Meets for record-keeping purposes
Kahoot	https://kahoot.com/	• Game-based learning platform • Multiple choice quizzes	• Allowed teachers to use quizzes during Google Meets to review or introduce content to students • Allowed teachers to create their own quizzes for class material • Allowed students to engage with other students in competitions around pop culture themes (Star Wars, Teen Lit., Memes, etc.)
NearPod	https://nearpod.com/	• Interactive slide deck presentations • Slideshows can be teacher-led or student-paced	• Allowed teachers to present lessons synchronously during Google Meets or asynchronously in Google Classroom • Allowed teachers to poll and quiz students during a slideshow presentation
PearDeck	https://www.peardeck.com/	• Interactive slides for use with Google Slides • Slideshows can be teacher-led or student-paced	• Allowed teachers to poll and quiz students during a Slides presentation • Allowed students to give written and illustrated answers to questions

Digital Tool	URL	Features of Program	Uses During Distance Learning
JamBoard	https://gsuite.google.com/	• Virtual whiteboard space • Shares and saves in Google Drive	• Allowed students to share out ideas and images during class discussions in Meet like digital PostIt notes • Allowed teachers and students to draw out or diagram ideas during brainstorming sessions (https://twitter.com/TriSciCurious/status/1220046217905725440?s=20)
Screencastify	https://www.screencastify.com/	• Screen recording software • Saves directly to Google Drive	• Allowed teachers to create instructional videos (when sharing their screen or recording slideshows) • Allowed teachers give oral feedback to students • Allowed students to narrate their own projects, give speeches, and perform their own material
Mote	https://www.justmote.me/	• Leaves voice notes on Google Suite applications • Creates a written transcript of voice notes	• Allowed teachers to provide oral feedback/comments to students • Allowed teachers to provide instructions for assignments in oral and written format on slideshows • Allowed teachers to create a written text version of their oral comments for accessibility

Teacher-experts also served informally as a "coach-on-call" for in-service teachers implementing educational technology. As the district instructional coaches' capacity to support struggling teachers decreased, teachers turned to teacher-experts for support with implementing technology. In the "coach-on-call" role (Anderson, 2020), teacher-experts provided on-demand support for teachers via phone, text, email, and Google Meets. Although initial questions from teachers were technical in nature, teacher-experts leveraged existing relationships with teachers to coach them beyond technical skills and to begin using multiple access points for distance learning. In this informal capacity, teacher-experts filled a gap in professional support for educational technology due to the accelerated implementation timeline of distance learning.

RESULTS

Within this high-poverty district, based on voluntary phone survey results indicating 32% of families did not have internet access available to them (see Figure 1), there was a need for targeted professional support on multiple access points to educational technology. Currently, no quantitative data is available surfacing the number of teachers who have taken advantage of their building-level teacher-experts to provide targeted professional support during the school closure. However, many of the teachers who have indicated a higher comfort level with using educational technology pre-COVID-19 have reported being called upon as a resource for their peers. They have acted as informal professional support during faculty meetings, PLCs, and via asynchronous and synchronous platforms, like Google Meets. One early adopter of technology described how her team members have asked more questions about the use of multiple devices and internet accessibility and were more receptive to the concept of using a cellphone application than they had been previously. In the past, Google Classroom (http://classroom.google.com/) had served to asynchronously disseminate content within the district. Recently, the district has seen an increase in the number of teachers who feel confident using this platform.
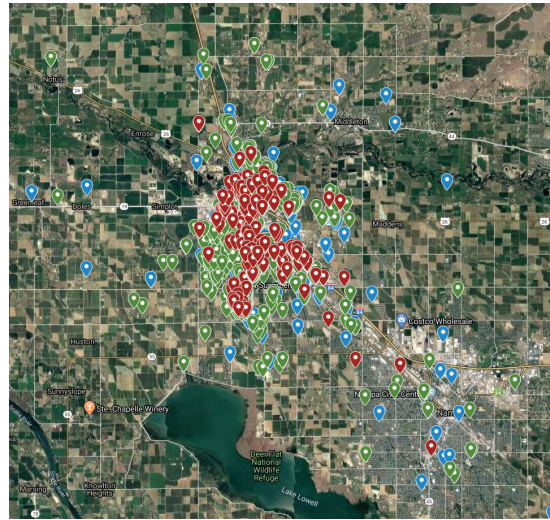
Figure 1. Results of the internet access survey. Red indicates no internet access, green shows internet access at home, and blue indicates access to parking lot Wi-Fi. (permission obtained 22 April 2020 from Caldwell School District to use this image)

IMPLICATIONS

As districts continue to plan for disruptions to face-to-face instruction, in-service educators should leverage professional networks and mentorship for implementing multiple access points to make equitable instructional decisions. When enacted at the lowest entry point, building-level teacher-experts are a strategy that may help educators identify and implement multiple access points across a variety of devices and technology platforms. As other districts seek to replicate the impact that teacher-experts have on addressing equity issues during distance learning, there are several implications for the use of this innovation.

Understanding Learning Community Needs

To build a deeper understanding of the access needs of students, educators should conduct technology surveys and use data to determine the functionality of technological tools and platforms across multiple devices and bandwidth (Bacos & Grove, 2019; Bendici, 2020). In this Idaho school district, once they had formal survey data and held informal conversations with students around technology access, teachers found it easier to identify professional development needs to better utilize building-level expertise for support with technology implementation. Many exemplar technology usage surveys are available for adaptation by districts interested in gathering data on the technology needs of the learning community (see Appendix B).

Expanding Informal Professional Networking Opportunities

Krutka and Carpenter (2016) documented evidence that educators should expand their informal professional communities to include ongoing conversations with a variety of technology users. Social media platforms, like Facebook Groups, are an efficient form of informal mentoring and professional development for both pre-service and in-service educators (Cinkara & Arslan, 2017). In this Idaho school district, informal opportunities for organic conversations included: (a) content and grade level PLC meetings, (b) administrators pulling teacher-experts into discussions during virtual faculty meetings, and (c) on-demand sharing of new technology platforms and updates through asynchronous methods like district email, Facebook Groups, and Google Chats (https://chat.google.com/). As building-level teacher-experts provide ideas for using multiple access points to distance learning, it is important to share not only the techniques and technology

tools, but to serve as a liaison between teachers and external professional learning networks. For example, during PLCs a building-level teacher-expert can show how they created a virtual Bitmoji classroom, mentor teachers in designing their own (see Appendix C), and connect teachers to the *Bitmoji Craze for Educators* Facebook Group (https://www.facebook.com/groups/2568655663438916/) to help them learn from others and expand their professional learning network. Another Facebook Group networking opportunity was the *Teachers Using Google Suite for Education - GEG Virtual* public group (https://www.facebook.com/groups/GSuiteTs/) since it gave teachers in this district access to other teachers who were using Google applications to share best practices and get fresh ideas.

Teacher-Driven Professional Support

In-service teachers should seek targeted support (Jonker et al., 2018; Margolis et al., 2017) and collaborative opportunities for implementing technology in equitable ways (Francom, 2016). In this Idaho school district, the organic movement toward teachers seeking building-level teacher-experts for on-demand support opened up opportunities for two-way learning. For example, one novice teacher shared that she was grateful for the opportunity to have building-level teacher-experts available for advice and consultation on various technology platforms as she worked to overcome her intimidation. As she asked questions of her teacher-expert, she was able to help him figure out and learn something new. Not only did teachers receive targeted support but building-level teacher-experts gleaned new understandings from the teachers they supported during these interactions. Moving forward, districts should consider how initial implementations of professional support, like leveraging building-level teacher-experts, can be scaled (see Appendix D) as they plan for future distance learning.

FUTURE RESEARCH

Recommendations for further research are based on the initial study results. In this district, this current model of professional development is not formalized, as the movement to utilizing building-level teacher-experts for distance learning support was organic. As districts prepare for future distance learning, we recommend leaders include building-level teacher-experts as an avenue for providing targeted support by creating guidelines and informal teacher leadership roles, like Teachers on Special Assignments (TOSAs; https://bit.ly/2ZhzRTI). Additionally, leaders should consider providing professional development opportunities on multiple access points to educational technology, particularly focusing on growing the skills of teacher-experts since previous research has indicated that this type of targeted professional learning may help to address equity issues (Steele et al., 2017; Tawfik et al., 2016). Leaders should work with instructional coaches and teacher-experts to formalize a variety of professional support opportunities (i.e. PLCs, phone, text, virtual 1:1 meetings) and establish a clear vision for leveraging teacher-experts for distance learning support (Ramadan, 2017).

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APPENDIX A

INFORMAL POLLING SAMPLE QUESTIONS

- How were you using technology in your classroom before school closures shifted your classroom into a virtual space?
- What device will you be accessing educational technology platforms from (since different platforms work differently on different devices)?
- Which features or applications from the Google Suite are you already using in your distance learning process?
- What hurdles have you run into as you have attempted to implement educational technology into your distance learning classroom? What has frustrated you about the platforms that you are currently attempting to use?
- What are you interested in learning about Google Classroom that would make creating assignments easier?
- What experience do you have with building digital activities in Google Classroom or with other Google applications?
- What types of interactions are you interested in having with your students through the Google Suite of applications? Will you be doing synchronous or asynchronous instruction, or maybe a mix?
- How comfortable are you creating multimedia presentations to share with your students?
- How comfortable are you with facilitating distance learning in a synchronous space using Google Meets?

APPENDIX B

LINKS TO SAMPLE TECHNOLOGY SURVEY TOOLS

Student Technology Use Survey (https://bit.ly/3bLVe28)
Student Study - Educause Center for Analysis and Research (https://bit.ly/3g6VcFo)
Free Technology Survey for Elementary Students (https://bit.ly/3cQkZiT)
Educational Technology Needs Assessment - Survey Monkey (https://bit.ly/2ZlBAr5)
Needs Assessment - Ms. Atkin's Resource Wiki (https://bit.ly/2LPSqGp)

APPENDIX C

EXEMPLAR VIRTUAL BITMOJI CLASSROOM WITH HYPERLINKS

https://bit.ly/36hO3O6

APPENDIX D

ON-DEMAND SUPPORTS

- NE Basecamp: On-Demand Support (https://www.nebasecamp.org/coach-support)
- BetterLesson: Live Instructional Support for Teachers, Leaders, and Caregivers (https://bit.ly/2Zsj1BL)
- EdConnective: Ask an Expert (https://www.edconnective.com/ask-an-expert)
- Smekens Education Solutions (https://www.smekenseducation.com/Remote-Coach.html)

Virtual Professional Development Design During the Pandemic

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This research study sought to design a technology-themed professional development protocol that focused on efficiency and teacher needs. The design capitalized on a teacher's cognitive surplus (Shirky, 2010), which is the free time typically used to scroll, swipe, and click through social media feeds. Seventy teachers from a rural school district in Ohio joined a private Facebook group that offered professional development activities-focused on using technology to deliver online instruction to students during the COVID-19 pandemic. Feedback has been positive and motivating, with high levels of teacher engagement. The design approach for this delivery method has the potential to serve teachers in many different circumstances in any subject area.

INTRODUCTION

There are so many demands placed on our mental capacities during a time of crisis that it can be hard to juggle our focus from one task to the next. What is often overlooked is the amount of time that can be unlocked if we consider activities that we habitually do without considering the time commitment, such as surfing, scrolling, lurking, or exploring social networks. This concept is best explained by Clay Shirky (2010), who calls it "cognitive surplus" (p. 27). To capitalize on teachers' cognitive surplus, a private Facebook group was established with the intent to create a community of learners bound by a common goal of developing their teaching skills for distance learning.

Teachers are already overwhelmed with responsibility, so adding constant professional development responsibilities to their schedules is not appreciated or effective. However, by taking advantage of cognitive surplus, professional development does not have to be a burden.

INNOVATION

The concept of using Facebook to deliver and support a teacher's professional development is not a novel idea. Many teachers actively engage in their own personal learning network (PLN). A PLN is typically teacher curated and tends to focus on a specific topic of the teacher's choosing (Kearney & Maher, 2019). What is different about this application is that it is district-mandated training, focusing on what teachers need to know versus what they want to know.

For this study, training was offered to 71 teachers in a rural Southeast Ohio school district. Participants ranged in experience from 1-30 years in all subject areas, from kindergarten to 6th grade. Levels of technology skill ranged from little or no confidence to confident and innovative.

The creation of materials began with an understanding of the context in which they would be used -- in this case, preparation for emergency online instruction due to the pandemic. Informed by relevant literature, design commenced utilizing adult learning theories (Knowles, 1984), diffusion of innovation (Rogers, 2003), and the ideals of participatory culture (Halverson et al., 2016). The result is a theoretical framework that fosters energy and structure for a virtual learning environment (Figure 1). Cognitive surplus is the resource that is being harnessed, social media serves as the means of communication, adult learning theories and diffusion of innovation guide the design of materials, and the nature of participatory culture provides the energy and climate that motivates engagement in learning.
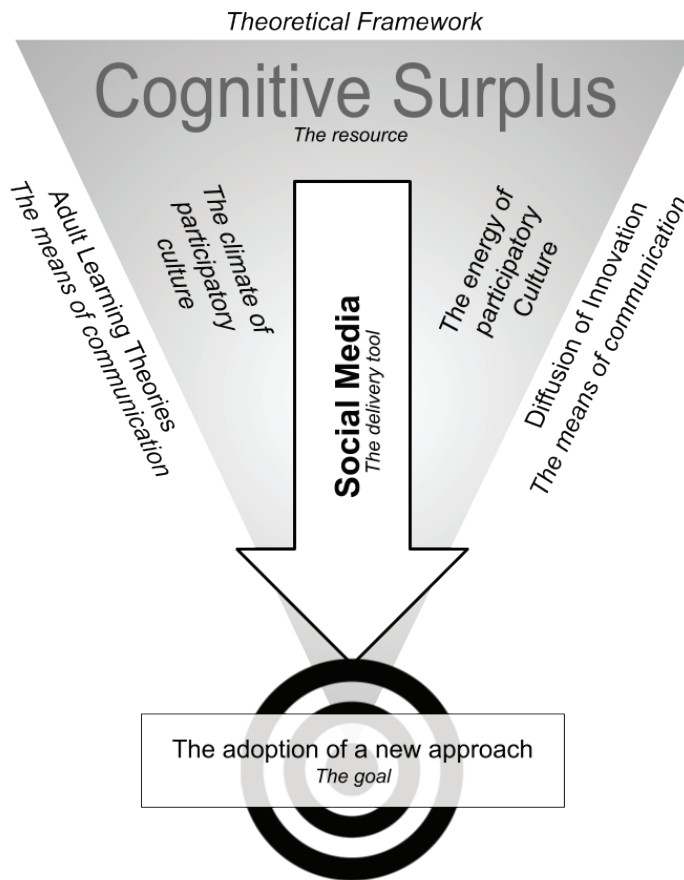
Figure 1. A theoretical framework for implementing PD.

Instructional materials were designed to be first delivered via an online workshop with follow up support delivered through a private Facebook group. One-hour daily live workshops were delivered online, using the video conferencing platform Zoom, over a three day period before online student instruction began. The objective for the workshop was to provide teachers with a foundation for designing their own instructional materials for online teaching using the Google Suite for Education. The Facebook group was opened up to teachers on the same day that instruction for students began (Table 1). Over the course of two weeks teacher training materials were created, delivered, and teachers began online instruction with their students. The intent of the Facebook group was to provide an active support group focused on content that would further the learning of material presented in the workshop. The assumption was that using a social media platform such as Facebook to deliver continued support would facilitate a more meaningful utilization of a teacher's cognitive surplus.

Table 1
A timeline of instructional events

Date	Event
March 20	Tech team planning meeting
March 23-25	Building team training sessions (one hour per day online workshop)
March 29	Facebook group goes live
April 3	Membership reaches 70 members
April 6	Teachers post their first lessons for students

From the beginning, design of the materials was iterative in nature, responding to the needs of the community of teachers as discovered through the analysis of the data collected through online interactions (Anderson & Shattuck, 2012). The Facebook group was launched with a few posts prepared in advance. Observations were made during the initial workshop presentations about questions and concerns expressed by teachers. Upon the launch of the Facebook group, content was prepared to address these issues. A few days after the launch of the Facebook group a poll was posted asking teachers what specific interest they had regarding their online instruction. Subsequently, content was developed to address those issues. In addition to using data from polls to inspire content design, data was also gathered from comments and posts made by the teachers. One to three posts were made daily depending on the amount of content that was available. Content consisted of links to public videos and blog posts, links to web tools, facilitator-created videos and mini tutorials (Figure 2), polls and surveys (Figure 3), announcements (Figure 4), live synchronous meetings, facilitator-created teaching materials for student use, and vlog style videos (Table 2). The content provided instruction on how to utilize a variety of web based programs that would aid teachers in creating instructional content for their students (Table 3). In this way the Facebook group served as an evolving repository of ideas, answers, and observations.
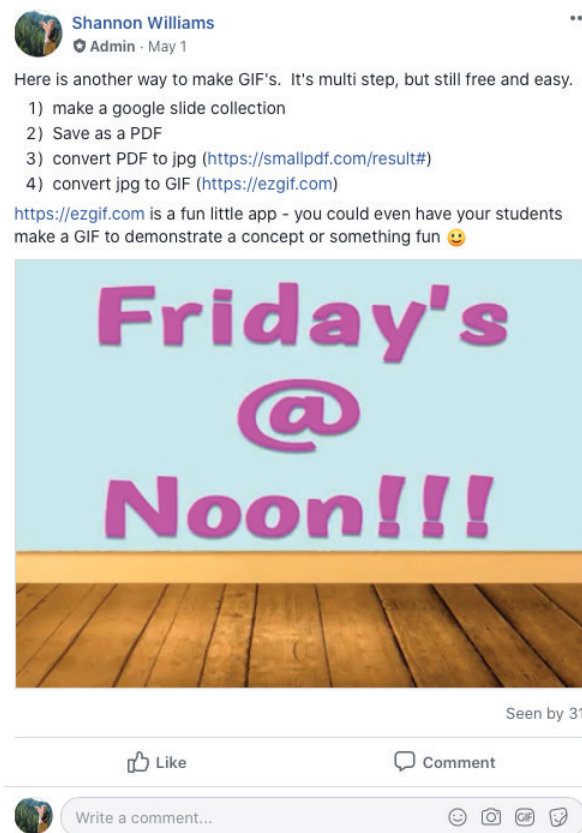
Figure 2. An example of a mini-tutorial on making GIFs.
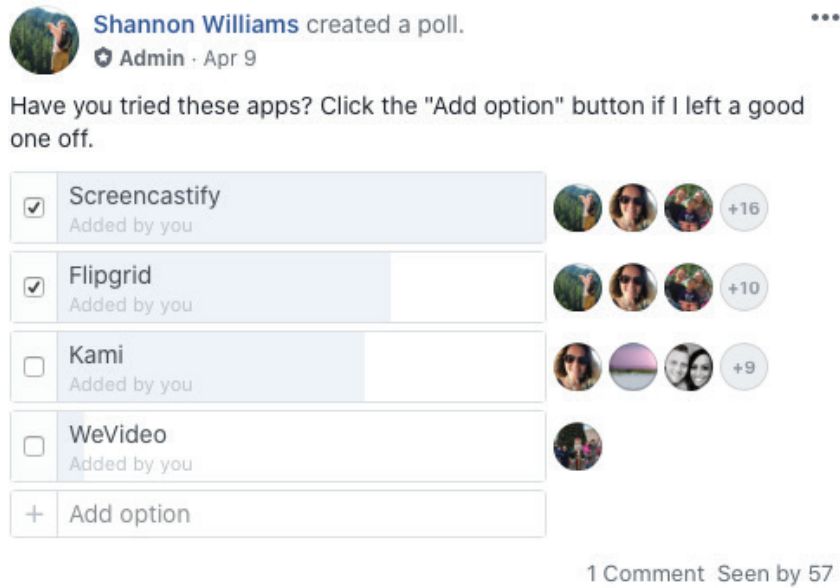
Figure 3. An example of a poll conducted for teachers.

Figure 4. An example of an announcement posted to teachers.

Table 2

Public or participant-created and facilitator-created resources

Public or participant created resources	Number of Posts
Blogs and web page links	23
Video links	23
Teacher questions and shares	14
Links to online tools	12
Facilitator-created resources	
Mini tutorials	11
Original videos	11
Survey, poll, request	15
Announcements	6
Live meetings	2
Student activities	2
Personal vlog style announcements	2
Demos	1

Table 3

Sample PD content delivered through the Facebook group

Topic	Link
Flipgrid (public link)	https://bit.ly/376jpro
Screencastify Tips (public link)	https://bit.ly/3ePLqGc
EdPuzzle (public link)	https://bit.ly/2za9g0g
How to Make a Slideshow (public link)	https://bit.ly/2UbZli5
Inserting Video Into Google Slides (facilitator created video)	https://bit.ly/2MxYdRn
Checking Your Work in Google Classroom (facilitator created video)	https://bit.ly/372L0cM
Scratch Tutorials (public link)	https://bit.ly/2zV87tX
Symbols & Fancy Text (public link)	https://bit.ly/2z5KjTF
Jamboard Demo (facilitator created video)	https://bit.ly/2Ubf5lm
Zoom Strategies - Meeting Waiting Screens (facilitator created content)	https://bit.ly/372Cfzk

RESULTS

This Facebook group has served the teachers well. From a design standpoint, the level of participation has been reassuring. Feedback has been positive and teachers have shared their appreciation for the role that it has played during this crisis. Teachers have supported each other through shared resources, shared successes and concerns, and encouragement offered to their peers. Engagement has been measured with onboard analytic tools allowing the design to be responsive to the participants' most urgent needs. Evidence of diffusion of innovation (Rogers, 2003) and adult learning theories (Knowles, 1984) became more relevant after analysis of the data, and as a result impacted design choices. The Facebook posts that better embodied these theories resulted in more engagement. Using the aforementioned theories provided more structure and consistency to the design of learning materials. Using social media to facilitate this type of learning affords many advantages. Teachers have been able to access the content on their own schedules and return to the learning whenever necessary (Cercone, 2008). Communication is familiar to the participants since most teachers were already Facebook users (Pew Research Center, March, 2008).

IMPLICATIONS

When designing a professional development delivery system using social media there are three components of design to address. The first is a needs assessment, second is the design of content, and finally the facilitation of delivery and community learning experience (Table 3). It is essential to first listen to the needs of the teachers to determine what content should be designed. While there may be mandated materials that are required for the professional development, staying in tune to what teachers believe they need in order to be successful is critical. In this way the design will stay true to the type of resources found in a typical PLN. Specifically, content intended to engage teachers needs to be problem-centered and self-directed, as adult learning theories would suggest (Knowles, 1984). The materials need to be specific to their immediate needs and support their ability to problem solve instructional challenges.

Focusing on content creation that utilizes adult learning theories and Rogers' (2008) Diffusion of Innovation theories is the next step in designing virtual professional development. To do this, offer new concepts in small chunks of information, provide timely feedback and words of encouragement, and revisit topics often providing examples from multiple authors (Cercone, 2008). The complexity of the material should be as simple as possible. The easier it is to understand, the more likely it is to be useful to teachers (Rogers, 2003). This can be achieved by keeping topics very focused and specific, which requires less time to explain. For example, videos should be marked with the view time, most being less than three minutes, so the level of time commitment will be known in advance (Guo et al., 2014). This will allow teachers to try out and experiment with new techniques on a limited basis, so they can learn by doing (Rogers, 2003). Each post should be clearly labeled with a topic heading and a brief description of the purpose or possible application of the new skill. Including this information will address the relevance of the information being shared (Cercone, 2008).

Finally, consider how social media will promote an opportunity for community building through participatory learning. Using a social media tool such as Facebook groups can help to promote the role and impact that peer leadership can play in influencing teacher engagement. Visibility of adoption fosters the exchange of new ideas. Encourage and celebrate the emergence of the early adopters who share their personal success and adventures providing reassurance to the next wave of adopters (Halverson et al., 2016). Let the use of polls and questions focused on relevant topics facilitate collaborative problem solving within the group. It is the participatory culture of social media that will promote relationships that result in learning and adoption of new skills.

Table 3

Design comments and strategies

Design Component	Design Strategies
Needs Assessment	• Ask probing questions during synchronous learning • Regularly post polls in the Facebook group • Observe comments and teacher created posts • Solicit needs from other stakeholders (district administration) • Solicit feedback from students about their needs
Design Content	• Average 2-3 posts a day • Regularly request feedback from teachers about their ongoing needs • Revisit topics often • Provide multiple viewpoints for new information • Break up content into small chunks • Provide timely feedback • Include topic headings or brief descriptions for each post • Posts should address a specific topic, very focused • Videos are preferred, kept short at < 3:00 • Post video and article read times so teachers know the time commitment in advance
Participatory Learning	• Celebrate when teachers in the group share their content and ideas • Use polls and questions to facilitate conversations in the group • Provide transparency for the need to share (all will benefit)

FUTURE RESEARCH

Addressing the components outlined in this model, assessing teacher needs, designing relevant content, and actively facilitating participatory learning, will promote meaningful use of a teachers cognitive surplus. In this way, social media, specifically a Facebook group, could be used to facilitate training in any subject area at any academic level, facilitated by a single trainer. With attention to thoughtful design, learners can be encouraged to take even more control over the content, becoming more independent. This is an idealistic notion, but seems even more possible based on the early findings of this study. More data about teacher preferences should be gathered to determine the most engaging design features for learning through social media.

Social media has its pitfalls and inherent dangers. However, these issues can be mitigated with thoughtful design (Fischer, 2011). Educators have an opportunity to capitalize on our collective cognitive surplus for the benefit of a community, large or small, making it totally worth the risk.

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Personalized Professional Learning in the Move to Remote Instruction During COVID-19

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Teacher professional learning is more important than ever due to the rapid advance of technology and the need to integrate it into the classroom, but traditional professional development has often proven ineffective at improving teacher practice and student outcomes. To successfully meet teachers' needs, professional development must be personalized, empowering teachers to integrate technology effectively and supporting them as they make the sudden move to remote learning due to COVID-19. All Saints' Episcopal School used a personalized professional development model with free online resources and existing school personnel to deliver personalized learning experiences to all of its preschool through twelfth grade teachers as they made the shift to online instruction. Initial results show that the personalized model has been very successful, although a few challenges remain. Implications for other schools and opportunities for future research are discussed.

INTRODUCTION

Despite a strong desire to learn new skills and improve their practice, the majority of teachers are unsatisfied with the professional development (PD) they receive (Hanson, 2017). While teachers need more training on how to effectively integrate technology and teach in innovative ways, traditional one time, "sit and get" PD has proven ineffective (Bruton, 2018; Darling-Hammond, 2009; Meeuwase, 2016; Reinhardt, 2018). Teachers are encouraged to differentiate classroom instruction for learners, but the same personalization is not usually offered to teachers (Bruton, 2018; Meeuwse & Mason, 2017; Yurkofsky et al., 2017). Even more relevant PD methods such as edcamps or workshops are generally one-time events without adequate follow-up or reflection on learning. The rapid advance of technology has left many teachers unprepared to integrate digital tools into their classroom effectively, let alone teach in a fully remote environment in the wake of the COVID-19 crisis. A solution to ineffective PD models is the implementation of personalized PD (Bruton, 2018; Hanson, 2017; Meeuwse, 2016; Meeuwse & Mason, 2017). Personalized PD meets the needs of all teachers, takes advantage of free online resources and existing school faculty, and can be delivered virtually.

Personalized PD acknowledges the knowledge, strengths, needs, interests, and content area of each individual teacher (Bruton, 2018; Hanson, 2017; Meeuwse, 2016). It involves teacher voice and choice in their own learning experiences, and is job-embedded and relevant (Bruton, 2018; Farris, 2015; Ruppert, 2019). Personalized professional learning involves coaching or mentoring as well as collaboration with other teachers (Bruton, 2018; Hanson, 2017; Meeuwse, 2016). It is reflective, takes place over a sustained period of time, and often consists of anytime, anywhere learning experiences (Bruton, 2018; Meeuwse, 2016; Ruppert, 2019). Teachers drive their own learning, and therefore are committed to and take ownership of the process (Bruton, 2018; Hanson, 2017; Meeuwse, 2016). Personalized PD shows that schools respect teachers as adult learners who are self-directed and intrinsically motivated (Hanson, 2017; Knowles, 1978, 1980). PD must value teachers' past experiences and existing knowledge and focus on skills that are immediately applicable (Hanson, 2017; Knowles, 1978, 1980).

INNOVATION

Like many schools across the world, All Saints' Episcopal School was faced with the challenge of moving all instruction online while upholding the quality of education that the school community expected in the wake of the CO-

VID-19 crisis. Although technology integration had been a focus before the pandemic, PD had mostly been conducted in traditional one-time workshops rather than tailored for each teacher and on a continual basis. A new approach was needed to meet the needs of over one hundred preschool through twelfth grade teachers as they shifted to online instruction. The goal of implementing personalized PD was to empower each teacher to successfully master distance learning best practices and technology tools while meeting all students' learning needs in the remote environment. All of our personalized PD ideas with links and examples are summarized on these slides (bit.ly/personalizedpd2020).

Resources and training began to be differentiated for each teacher through individual check-ins; sharing specific materials, tools, and best practices (bit.ly/onlinetandl) with groups of teachers; and offering anytime live support available remotely. For example, teachers met as needed with the technology specialist via FaceTime or Zoom to learn about or get support with technology programs. Teachers were given significant voice and choice in what they needed to learn to accomplish the goals of the courses they teach, and multiple means of instruction were offered. The school's technology training website for teachers, techtidbits.net, became a home base to share articles (bit.ly/onlinetandlarticles), resource guides (bit.ly/onlinetandlresources), tutorials (bit.ly/asestutorials), online mini-courses, and digital certification programs (bit.ly/digitallearningcertsandtrainings). The website allowed teachers to access resources on topics they would like to learn more about. A badging program (bit.ly/asesbadgingprogram) was also developed to encourage teachers to try new things and recognize their efforts. Email and Google Classroom were used to share resources and promote collaboration between teachers, as collaboration is an essential element of effective PD. A Google Classroom for all the teachers at the school was set up so teachers could share ideas, successes, challenges, and ask questions. Grade level and content area teams as well as divisions and departments began to meet regularly via videoconference to share ideas and assist one another with challenges. "Saints Shoutous" were sent to share teacher successes along with student work samples, and a compilation of our teachers' top tips for remote learning (bit.ly/onlineteachingtoolsandtips) were compiled. These were some of the most successful methods used, as they allowed teachers to learn about what other teachers were doing and apply it in their own online classroom. Teachers also were encouraged to collaborate with those outside the school, such as through Facebook groups and Twitter. Surveys (bit.ly/onlinelearningsurveys) asking teachers and students about the successes and challenges of remote learning encouraged reflection, as did check-ins with administrators and technology and academic specialists. Coaching and mentoring were provided throughout the process by the technology integrationist, academic curriculum specialist, librarians, administrators, and experienced teacher-leaders. The learning was relevant and job-embedded because teachers immediately applied it in their virtual classrooms and could choose to delve into specific issues they needed a solution for. The learning continued as teachers became increasingly comfortable teaching remotely. Teachers expressed that they will continue to utilize many aspects of what they learned when they return to the brick-and-mortar classroom, such as digital learning tools and flipped classroom teaching methods.

RESULTS

According to survey results and follow-up interviews with teachers, the approach has been very successful. Teachers learned what they felt was most important and were able to continually utilize the resources to direct their own learning based on the needs of their students, and 73% now report that they are confident or very confident in their ability to teach remotely. Perhaps the greatest success was many teachers' shift toward more personalized and student-centered teaching methods in their own online classrooms, which has in turn cultivated student agency and engagement; factors that are especially important in remote environments. About 80% of All Saints' teachers report that they will teach differently when they return to the classroom, utilizing the student-centered instructional methods and technology integration strategies they learned about during this experience. According to teachers, the greatest challenge with the personalized approach was the lack of specific guidance from administration. Although teachers appreciated having autonomy, they sometimes felt they did not know exactly what was expected of them when the same training was not provided to everyone. Based on this feedback, we have begun developing a Philosophy for Distance Education with more specific guidelines for both teachers and families (bit.ly/academicphilosophyforde).

IMPLICATIONS

Similar methods can be utilized by other schools to meet the needs of their teachers. First, schools must commit to providing relevant, job-embedded professional development that is differentiated to meet teachers' varying needs as

well as sustained over time to allow teachers to continually improve their practice (Bruton, 2018; Farris, 2015; Ruppert, 2019). The elements of highly effective PD can then be used as a basis for various types of personalized offerings. For example, PD can be targeted to teachers' specific needs by providing individual or small-group check-ins, sharing tools and best practices with the teachers they are most relevant to, and offering anytime support available via technology coaches or I.T. technicians (Bruton, 2018; Hanson, 2017; Meeuwse, 2016). Teacher agency and a focus on relevant learning can be cultivated by offering a variety of materials and training options for teachers to choose from, allowing teachers to choose online certification options or webinars to fulfill PD requirements, and using a badging program or choice boards to allow teachers to decide what skills to master (Bruton, 2018; Farris, 2015; Ruppert, 2019). Coaching and mentoring should be part of the process, whether through dedicated technology and instructional coaches, teacher-leaders, or other school faculty such as librarians (Bruton, 2018; Hanson, 2017). Collaboration among teachers, both within the school as well as outside it, should be fostered through online communities and dedicated recognition programs, allowing teachers to share advice, ideas, and best practices (Terrell, 2017). Finally, reflection and feedback are vital for PD experiences to be highly effective, so teachers' and other stakeholders' input should be solicited often and opportunities for improvement addressed (Ruppert, 2019).

FUTURE RESEARCH

Past research and preliminary findings show that personalized PD can be highly effective at meeting teachers' needs. However, more research is needed on how to effectively balance personalized professional development experiences with standardized expectations, as well as how to successfully scale and track personalized PD experiences. It is also important for preservice teacher preparation programs to personalize the learning experience. Programs should take into account students' strengths, interests, and content area and grade level preferences, to name a few. Certifications, microcredentials, badging programs, coaching, and teacher leadership models all offer promising solutions that should be investigated further in their use for personalized PD for preservice and inservice teachers (Berry et al., 2016; Berry, 2017; Brown, 2019; Goerner, 2016; Terrell, 2017; Will, 2017).

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Tutoring in Online Environments: A Topic for Professional Development

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During the time of COVID-19, teacher educators and future teachers need to devise creative strategies to meet the needs of low performing students in digital environments; professional development opportunities could focus on the use of online tutoring. This project investigated an online one-to-one tutoring program and its impact on low performing students' achievement. Low performing students performed significantly better on the Northwest Evaluation Association Measures of Academic Progress tests than similar students who did not participate in the online tutoring program. While schools are closed, teacher educators could provide professional development opportunities on the use of online tutoring to support student learning.

INTRODUCTION

Teacher educators and future teachers are facing an unprecedented challenge to find ways to meet the needs of all students without the benefits of face-to-face interaction. The goal of this project was to evaluate the impact of a one-to-one online tutoring program on student achievement and skill development, as measured by the Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) standardized tests; this intervention may be especially useful for teacher educators to be aware of as an intervention to reach low performing students during the time of the COVID-19 pandemic. Generally, in face-to-face environments, tutors are effective in improving student learning, as tutoring has an effect size ranging from 0.4 to 2.0 (Bloom, 1984; Chi, Roy, & Hausmann, 2008; Chi, Siler, Yamauchi, Jeong, & Hausmann, 2001; Cohen, Kulik, & Kulik, 1982; Roscoe & Chi, 2007; VanLehn, 2011; VanLehn, Graesser, Jackson, Jordan, Olney, & Rose, 2007). A targeted one-to-one online tutoring program was implemented to help improve students' mathematics and English scores at a large virtual school in the southeast; the use of this service may be especially beneficial for teacher educators and future teachers as a means of reaching low performing students when face-to-face interaction is limited; therefore, professional development opportunities regarding online tutoring as part of a distance learning curriculum are warranted.

INNOVATION

The school identified 382 low performing students between 3rd and 12th grade based on a combination of previous standardized test scores and teacher referrals, and then notified them of the opportunity to participate in a school-sponsored live one-to-one tutoring program. Students who participated in a minimum of ten tutoring sessions received a $10 gift card. Throughout the year, low performing students had the opportunity to schedule one-to-one online tutoring sessions to develop their mathematical and English proficiency levels. Throughout the tutoring process, students were paired with the same virtual tutor over 80% of the time, and each session covered either mathematics or English. Generally, students participated in one to three tutoring sessions a week, which lasted 40-60 minutes, all depending on the availability of the student. On average, students received 17.5 hours of tutoring, for a combined total of 6,700 hours of tutoring across all 382 students. The virtual tutors were trained to address the unique needs of the students and school system.

RESULTS

After matching students based on their Fall 2018 NWEA scores, students who received tutoring had significantly higher NWEA scores at all subsequent points of measurement during the 2018-2019 school year. Specifically, on the winter administration of the NWEA, tutored students ($M = 213.01$, $SD = 20.65$) scored on average four points higher than students who did not receive tutoring ($M = 209.24$, $SD = 18.87$), $t(869) = 2.81$, $p = .005$, $d = .19$. On the spring administration of the NWEA, the change was more pronounced with students who received the tutoring ($M = 215.09$, $SD = 21.59$) scoring on average nine points higher than participants who did not receive tutoring ($M = 206.70$, $SD = 18.58$), $t(869) = 6.14$, $p < .001$, $d = .42$. Likewise, tutored students had significantly higher end of year growth scores ($M = 5.45$, $SD = 12.34$) than students who did not receive tutoring ($M = -3.24$, $SD = 12.76$), $t(869) = 10.23$, $p < .001$, $d = .69$. Students who participated in the online tutoring program scored higher on the MAP tests than students who did not participate. Given the impact that tutoring can have on student success, online environments now offer the unique ability to provide a high-quality, trained tutor to anyone with an Internet connection and a digital device.

	Winter Administration of the NWEA	Spring Administration of the NWEA	End of Year Growth Scores
Tutored Students	$M = 213.01$, $SD = 20.65$	$M = 215.09$, $SD = 21.59$	$M = 5.45$, $SD = 12.34$
Students who did not receive tutoring	$M = 209.24$, $SD = 18.87$	$M = 206.70$, $SD = 18.58$	$M = -3.24$, $SD = 12.76$

IMPLICATIONS

As both teacher educators and future teachers work from home, online tutoring could be one component of professional development so that future teachers are prepared to use online tutoring as a tool, or as one piece of a larger distance learning curriculum, during the time of COVID-19. Using the following four steps, professional development regarding online tutoring would make preservice teachers aware of online tutoring programs by: (1) sharing demonstrations of FEV Tutor/Learn to Be, (2) deconstructing and critiquing example tutoring sessions, (3) evaluating the costs and benefits of using an existing tutoring program or training tutors, and (4) exploring online tutoring as a complementary piece of a larger distance learning curriculum. One of the difficulties all students face when distance learning is a likely decline in motivation; the one-to-one accountability and interaction with an online tutor may provide additional motivation to students who are most at risk to fall behind during distance learning (Lepper, Aspinwall, Mumme, & Chabay, 1990). Given the motivational and academic benefits of online tutoring, it may be especially useful as part of a distance learning curriculum during the time of COVID-19. After professional development regarding online tutoring has taken place, preservice teachers should be equipped to make decisions regarding the conditions under which online tutoring may best serve their specific student populations. For some preservice teachers, programs like FEV Tutor and Learn to

Be, which offer online tutoring assistance for all students may be the best option; these results demonstrate their utility in reaching low performing students. Other preservice teachers may decide to offer their own online tutoring options using Zoom, Google Meet, Microsoft Teams, or Skype.

Policy regarding the use of tutoring should be designed to support teachers in the use of online tutoring during and beyond the period of distance learning necessitated by COVID-19. In 2015, the Every Student Succeeds Act (ESSA) impacts how federal money can be used to support education technology and digital learning. In addition to funding the technology itself, ESSA also includes professional development and training opportunities for teachers, principals, and school leaders on how to effectively use that technology in the classroom. During this unprecedented time, additional funding has been made available for school districts through the Coronavirus Aid, Relief, and Economic Security (CARES) Act to support local school systems in their efforts to provide continuity of learning through a virtual or distance learning environment. Three billion of the $30.75 billion allotted to the Education Stabilization Fund through the CARES Act for the Governor's Emergency Education Relief Fund (GEERF) provide emergency support for systems to continue to provide educational services to their students and to support the on-going functionality of the system (for additional information see, Section 18002 of the Education Stabilization Fund). An additional $13.2 billion in funding through the Elementary and Secondary School Emergency Relief Fund, provides opportunities for local school systems to purchase technology needed to support learning and plan for activities related to summer learning and supplemental programs (e.g., tutoring) for students at risk (for additional information, see Section 18003 of the Education Stabilization Fund) (US Department of Education, 2020).

Given the funding availability through the ESSA and CARES Act, money should be set aside to provide tutors for students, as the effect size ranges from 0.4 to 2.0 (Bloom, 1984; Chi, Roy, & Hausmann, 2008; Chi, Siler, Yamauchi, Jeong, & Hausmann, 2001; Cohen, Kulik, & Kulik, 1982; Roscoe & Chi, 2007; VanLehn, 2011; VanLehn, Graesser, Jackson, Jordan, Olney, & Rose, 2007) and tutors are an effective component of whole school interventions (Borman, Slavin, Cheung, Chamberlain, Madden, & Chambers, 2007). Second, given limitations of resources -- money, time, people, bandwidth, etc. -- districts should encourage the type of tutoring that will work well in their environment. For example, both one-to-one tutoring and small group tutoring is effective (Slavin, Lake, Davis, & Madden, 2011; Wanzek & Vaughn, 2007). Additionally, high dosage group tutoring is associated with school effectiveness (Dobbie & Fryer, 2013; Fryer, 2017). Third, schools should make programs like FEV Tutor available for students and provide professional development for in-service teachers.

FUTURE RESEARCH

This project used FEV Tutor to support student success; in future replications, teacher educators, future teachers, and policy makers could create and evaluate other online tutoring programs, as well as provide professional development opportunities to train teachers to critique and implement online tutoring including the four steps outlined above. Professional development opportunities could focus on deconstructing example tutoring sessions in order to maximize the effectiveness of online tutoring. Additionally, future research could explore the impact that both the duration and the number of tutoring sessions have on student success, as well as the impact of social agency. Future research is also needed to explore the social and motivational advantages that online tutoring likely provides under distance learning conditions. Given the established knowledge of teacher educators, they should lead the way in transitioning effective teaching techniques (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013) to online tutoring environments as an effective intervention during the time of the COVID-19 pandemic. Successful replication would require teacher educators to provide professional development regarding evidence-based tutoring as a first step in a strategy for including online tutoring as part of a comprehensive distance learning curriculum.

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Asynchronous Professional Learning:
An Online Conference to Connect Pre-service and In-service Teachers to Current Research

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Graduate students and alumni from a course-based Master of Education program engaged in knowledge mobilization with pre-service and in-service teachers through an asynchronous, online conference. Presenters prepared narrated digital research presentations, which were then shared over the one-week conference period. The process used and the supports provided for presenters for this small-scale conference informed teacher education programs and K-12 schools seeking strategies for knowledge mobilization and professional development activities during the COVID-19 closures. This approach holds promise for replication by other instructors interested in using this pedagogical approach for pre-service teacher education and in-service professional learning in future.

Keywords: Professional learning; Online conference; Asynchronous learning; Knowledge dissemination

INTRODUCTION

Connecting in-service teachers to current research is one of the challenges of professional learning, especially during the pandemic when professional learning must happen at a distance. As Timperley (2011) affirmed, though all education practitioners naturally engage in some form of reflection on daily practice, to substantively transform practice, educators need to access and then consider ways of thinking differently. Part of this consideration involves connecting with the specialist expertise that research can provide. Typically, MEd programs provide practitioner-students with the opportunity to challenge their thinking and practice in these ways (Willison & O'Regan, 2007; Wilmore & Willison, 2016). In the MEd course-based programs at the University of Calgary, students explore professional problems of and develop research-based skills in their capstone projects (Jacobsen et al., 2018). However, in order to fully realize the potential that newly created knowledge has to advance practice, it is essential that other practitioners (in-service and pre-service teachers) are able to access this knowledge. Knowledge mobilization activities are essential for putting knowledge into action (Campbell et al., 2017) and making research accessible as a form of professional learning. This paper presents our experiences of piloting an asynchronous, online conference as a vehicle for Master of Education (MEd) student-researchers to engage in knowledge mobilization with an audience that included both pre-service and in-service teachers at a distance. This method of knowledge sharing has since been used within our teacher education program as a way for any group (students or otherwise) to share knowledge at a distance.

INNOVATION

In preparation for our knowledge mobilization event, graduate students and recent alumni were invited to submit proposals for a refereed, online conference called *Connecting Research to Practice.* Proposals were reviewed by the co-ordinator, and once accepted, presenters were invited to submit a digital presentation (approximately 10 min. in length) that highlighted the findings and implications of their capstone research projects. Capstone research projects are completed by MEd students during their final year of their program and include a broad range of topics such as inclusion, literacy, languages, gender, and leadership. To assist with coordination of the conference, an institutional grant ($500) was accessed to hire a graduate student to help support the presenters. No other funds were accessed to support this pilot project and the event was held free of charge to delegates and presenters.

Presenters were provided with exemplars of digital presentations as well as resources on how to create digital presentations. An information session was held to support presenters, and potential tools for developing digital presentations were suggested (e.g., Video Scribe, Sho.co, Articulate, Prezi, Keynote, etc). Some links to web-based supports were also shared as options for presenters and presenters were encouraged to use a platform that they were comfortable with (Table 1).

The conference audience included pre-service teachers in their final semester of course work and about to begin their final field experience, as well as in-service teachers interested in accessing the conference for professional learning. A final audience included the university faculty and graduate student community at large.

Table 1
List of Sample Resources for Creating Digital Presentations

Digital Services: University of Calgary	*https://library.ucalgary.ca/labnext*
Research Posters: University of Calgary	*https://library.ucalgary.ca/c.php?g=255572&p=1704061*
Digital Tools for Presentations: University of Sussex	*http://www.sussex.ac.uk/skillshub/?id=311*
10 tips for Improving Your Presentations Today: Presentation Zen	*https://www.presentationzen.com/presentationzen/*

The conference comprised two keynotes and 15 digital presentations with discussion threads that were "active" for one week. One keynote involved a panel discussion of alumni from the program reflecting on their experiences as emerging researchers, while the other keynote explored professional learning networks as an ongoing source of professional learning. During this conference period, delegates had full 24/7 access to all conference content and could communicate with the presenters using the discussion threads connected to each presentation. Throughout the week, presenters regularly responded to comments and questions in their own discussion thread. Conference delegates could earn a certificate of participation, which could be included as part of a professional learning portfolio, by engaging in two or more discussion threads. Following the one-week conference, the discussion threads were closed for interaction; however, all participants were provided with access to the conference archive for an additional two months. Reviewing activity reports from the Learning Management System that housed the conference provided evidence of participation from close to 600 delegates.

IMPLICATIONS

Research indicates that during times of crisis or emergencies, teachers need access to specific and relevant supports for their emergent teaching contexts (Hos & Cinarbas, 2018; Ray & Hocutt, 2016; Wood and Goba, 2011). This asynchronous conference is one way to provide a continuity for professional learning experiences during and potentially after the pandemic. It is also a meaningful way to connect in-service and pre-service teachers with research-informed professional learning opportunities. This format is also an efficient way to share knowledge (such as that found in final presentations) within teacher education classes.

The format of this conference allowed participation from students and practitioners at a distance from the university (Maher & Prescott, 2017), and enabled presenters to reach a broad audience without any travel or use of facilities. For in-service teachers, the format of the presentations is ideal: these were research-based presentations that shared implications for practice in a short amount of time. In addition, most of the presenters were themselves in-service teachers, and participating in this conference did not require them to be absent from work. In-service teachers noted the digital presentations made research accessible beyond the conference venue (e.g., for sharing with colleagues during staff meetings or professional learning days organized for school staff). School leaders reflected that they could design professional learning events using the conference format in order to maximize the professional learning budgets in their school district and accommodate professionals working from home. The asynchronous nature of the conference provided presenters and delegates flexibility and choice for the time and duration of their participation. For in-service or pre-service teachers working or learning in remote context or communities, this event was easily accessed.

Presenters indicated that they had a positive presentation experience and were able to engage meaningfully with delegates. At least two presenters were invited to offer a more detailed presentation of their work to other audiences (e.g., school staff, undergraduate class). Presenters also noted that an added benefit in creating a digital presentation was the prospect to re-purpose the presentation for further dissemination of their research.

A key takeaway from our experiences was the need to host the conference on a platform that is open access. The Learning Management System we used required anyone from outside of the University community to register for the conference well in advance. An open access platform would enable greater participation from in-service teachers and offer an opportunity to continue the connections more broadly through professional learning networks. Participants and presenters could form networks that transcend geography and provide a means for easily embedding emerging research within local schools and districts.

FUTURE RESEARCH

The format of the conference provides a safe way to engage in knowledge mobilization and professional learning activities during periods of physical distancing or campus closures. Additional research inquiring into how teachers are taking up the knowledge presented, and into additional ways to support teachers' professional learning needs during the pandemic is needed. Research inquiring into how Education faculties provide a continuity of education for pre-service teachers is also warranted. In addition, while an online conference such as the one described, here provides opportunity of access for educators at a distance, more research is needed to learn how the technology required to access the conference presented a barrier as we discovered. This would also be relevant to in-service teachers who have had to move their pedagogy online during the pandemic, as not all students have the same access to technologies at home as they would have at school. Action research (Hendricks, 2016) offers potential of an iterative opportunity to explore how to best navigate a response to teaching and learning amid a pandemic, as well as to reflexively consider barriers induced by technology across all learning and teaching.

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Teaching with a Non-Traditional Mindset: Lessons Learned from In-service Teachers

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In this paper, we report findings from an initial qualitative survey focusing on teacher perceptions and implications for new learning during this time of unprecedented change due to an international pandemic. In March 2020, PK-12 educators across the nation were forced to employ instructional strategies to teach students via distance technologies and this research team sought insight into their pedagogical discoveries. A survey was implemented to ask in-service teachers about their perceptions and experiences based on the sudden shift. Significant themes indicated teacher's frustration with student's lack of accountability, frustration with technology access, and frustrations with balancing the new working from home norms. This chapter focuses on the recommendations for future preparation of in-service teachers should this become a recurring norm. Data was collected through a call placed on social media and teacher messenger boards. There were 55 in-service P-12 teachers across the United States who responded to this early call.

INTRODUCTION

With the onset of this international pandemic, schools were forced to move instructional delivery online while the world sheltered in place. A misleading assumption is that online learning is easy to implement simply by assigning work to students to complete on their technology devices. Research indicates P-12 students and/or teachers may experience more difficulty in this environment (Kiekel, Flores, & Walters, 2019) which prompted this study. P-12 teachers lack experience teaching in such environments (Barber, Clark, Siko, Debruler & Bruno, 2019) which creates significant challenges. Moreover, a major challenge for P-12 students stems from the fact that students are less cognitively mature than older learners, and there is more reliance on an instructor, especially in an online environment (Sanga, 2019). These challenges call for additional investigation of the pedagogical tools provided to support both in-service teachers and P-12 students.

Research in the area of P-12 online teaching support and teacher efficacy is lacking. Much of the available research concentrates primarily on what to teach rather than how to teach it (Borup & Evmenova, 2019) and focuses more on higher education practices than P-12 learning (DiPietro, Ferdig, Black & Preston, 2010). The dissemination of best practices in teaching often lags behind the rate of change, especially related to the use of technology (Burdina, Krapotkina & Nasyrova, 2019). Currently there is no common practice to prepare pre-service or in-service teachers to move to online teaching (DiPietro et al., 2010). The decision to survey in-service teachers to learn their frustrations with the sudden switch will add to the literature and help pre-service programs develop effective courses and field experiences to better prepare pre-service teachers to use online learning strategies when they become in-service teachers.

A survey seeking qualitative data was sent to in-service P-12 teachers requesting their experiences related to the current climate of educating students. Using P-12 message boards, Facebook, and Twitter, in-service teachers were able to view the link to the survey and share with colleagues. With the advent of social media in the 21st Century, these platforms have enabled widespread dissemination of information in real-time, encouraging a wide range of respondents (Hajil, 2015). All respondents were in-service teachers. The experience level of participants (n=55) was reported as less than 5 years (n=9), five to ten years (n=16), ten to fifteen years (n=10), fifteen to twenty years (n=10), and twenty-plus years (n=11).

Survey research is designed to elicit descriptions about a phenomenon in order to gain an understanding of shared experiences (Merriam & Tisdell, 2016). Surveys are easy to use and describe the experiences in easy to understand terms that can be compared across respondents (Merriam & Tisdell, 2016). This survey included open-ended question seeking in-service teacher experiences with the sudden shift to online delivery (see Appendix). The research team analyzed responses, triangulating the data into themes, but only questions related to frustrations informed this chapter. Focusing on the frustrations, the authors felt the information could best be used by district administrators and pre-service programs to better prepare teachers should a future event necessitate a sudden shift to teaching online.

RESULTS

A summary of themes related to teacher frustrations from the sudden, immersive state of P-12 learning is reported as a means of informing future research and suggesting changes to pre-service education programs and in-service professional development. Three significant frustrations were reported that could be addressed by changes to these areas: a). A lack of student participation and accountability; b). Technology usage challenges; and c). Personal frustrations.

The most often reported frustration related to lack of student participation and accountability (see figure 1). P-12 students still rely heavily on teachers (Burdina et.al, 2019). The separation of teacher and student via a learning management system, accompanied by the lack of experience of students with distance learning methods, leads to student disengagement and failure to complete assignments as prescribed. The sudden nature of the shift to online learning meant that teachers did not have time to prepare students for the shift and ensure the skills necessary for online learning were present. This can lead to lasting effects on a student's emotional and academic confidence being placed at risk (Steinmayr, Crede, McElvany, & Wirthwein, 2015) based upon the developmental progression of children and adolescents. Younger learners have more difficulty navigating an online classroom due to reliance on teacher leadership (Burdina et al., 2019). Academic content respondents (English, Mathematics, Science, and Social Studies) did seem to report better participation than respondents who taught elective courses (Choir, Art, Theatre Arts, and Foreign Language).
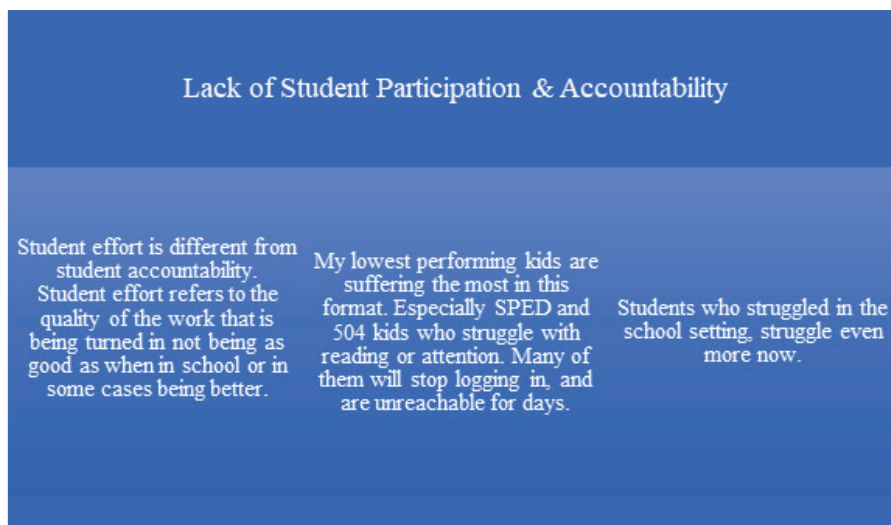
Figure 1. Lack of Student Participation and Accountability.

The second most often reported frustration was from teachers in low-income districts where students have limited to no access to technology (see figure 2). Some respondents reported creating paper packets that were sent home to students without access to technology. With nearly 12 million schoolchildren not having access to the Internet, being able to complete the work required becomes difficult (America's Digital Divide, 2017). While this was a frustration for many respondents, it is not something that can be addressed directly through educator preparation or professional development.

Figure 2. Technology Usage Challenge.

The final most often reported frustration related to personal frustrations (see Figure 3). Respondents found frustrations ranging from lack of support to changing administrative directives to balancing teaching with personal situations. Because a majority of teachers never expected to have to teach online, they are not familiar with online teaching pedagogies and districts do not have enough instructional technology experts to be able to support an entire district now moving to online delivery. Changing administrative directives was a frustration with reports of changing district missives on a regular, sometimes weekly, basis. Finally, the need to balance teaching duties with the realities of being sheltered in place and having to balance work-home activities leads to a need to offer resources for emotional support, including online counselors (Collins, 2020). Mental health wellness is a real and prevalent issue, and schools must rise to the challenge of protecting the well-being of their teachers.

Figure 3. Personal Frustrations.

IMPLICATIONS

Teaching online is different from teaching face-to-face. Based on the frustrations reported, teachers, no matter their experience, must be trained to use classroom technology in order to create experiences for students that are challenging, enriching, and support teacher's efficacy in the classroom (Borup & Evmenova, 2019). P-12 online learning is currently the largest population of students (Borup, 2016). Whether this is because of a pandemic, or just the opportunity to take advantage of the diversity of pedagogy and academic content, there is a need to ensure that teachers can effectively engage students in an online classroom.

There is no standard for preparation to teach online at either the pre-service or in-service levels (DiPietro et al., 2010). Teachers interested in teaching online often search out professional development which is primarily provided by virtual schools (Huss, 2019). While taking an online course may give a teacher an understanding of what it is like to be a student in such an environment, it cannot fully provide the skills necessary to be successful as an instructor in an online classroom (Huss, 2019). The difficulty in learning to teach online through taking an online course lies in the fact that the learning management system obscures some roles online teachers play – such as instructional design, providing feedback, and basic online pedagogies (Davis & Niederhauser, 2007). Pre-service programs are also slow to implement any form of online field experience courses related to online teaching (Moore-Adams, Jones & Cohen, 2016) which may further obscure these roles.

Given the need to prepare pre-service and in-service teachers for a future where online learning can be implemented throughout the P-12 spectrum, it will become important for educator preparation programs to include more offerings for professional development. This can include such things as 1) Pre-service programs offering at least one course directly related to teaching online allowing candidates to experience online education from both teacher and student perspective, and 2) Providing trainer-of-trainer opportunities where in-service teachers are trained and returned to their institutions to train and mentor various departments or grade levels.

FUTURE RESEARCH

Given the rapidity and scale to move to online learning and the shortage of research about such an undertaking, there is much to be explored. There is also a large population of teachers from whom to draw data. Based on the initial findings from our survey, future research opportunities relate to looking at how pre-service programs and school districts can better prepare teachers, and P-12 students, for such a radical shift in teaching and learning. This research can take the form of 1). Examining policies related to pre-service and in-service professional development; 2). P-12 student preparation; and 3). Using the same survey to compare the experiences of US teachers with those of teachers around the world. These areas can provide the impetus for continuing critical dialogue to promote online readiness and support for pre-service and in-service teachers. Getting educator preparation programs more involved in the process will be a major part of moving forward in the process.

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APPENDIX

SURVEY

<u>Demographic information</u>

How long have you been teaching?
Grade level
Subject matter
How many preps do you have?
Male/Female

<u>Survey Questions</u>
1. Have you ever taken an online class?

2. Have you ever taught online? If so, for how long?

3. What mode of delivery is being used by your school/district? (Zoom or other electronic meeting room, learning management system)

4. Did you receive any training on any of these modes of delivery prior to putting your class online?

5. What training would you like to have had prior to this time?

6. What type of support do you receive at this time?

7. What are district requirements for amount of work for students to complete?

8. Are you creating your own online content or using pre-designed content?

9. How do you assess pre-designed content?

10. If you are required to have face-to-face meetings with students, how many students per class do you meet with per week?

11. Does your district have a required conference time with students?

12. How do you think students are adapting to this method of course delivery? Can you give examples?

13. What are your perceptions of effectiveness of your online courses?

14. What frustrations have you encountered? Have you worked through them? How?

15. How do you think this will affect the start of the next school year in terms of academic achievement?

16. How has the relationship with your colleagues changed?

17. Will you continue to use online teaching techniques when things return to normal?

Teaching the Teachers During Remote Learning

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Transitioning a high school to remote learning during the Coronavirus pandemic brought to light the various needs of a school community aside from the electronic device gap. In addition to preparing for students to engage in online learning, the needs of the teachers had to also be considered. This article discusses how administration supported teachers in transitioning a small public high school in a historically underserved district within the New York City Department of Education to a remote learning environment. Andragogy and adult learning are discussed as a foundation for the shaping of professional development and support for teachers in an online learning environment.

INTRODUCTION

Teacher self-efficacy dramatically impacts student achievement. Supporting a school-wide transition to remote learning in the current climate of the Coronavirus pandemic must consider the needs of the teachers if they are to have a positive impact on student learning during the remote learning phase. Transitioning today's high school student to technology and an online platform as the learning environment may be easier than training the teachers to utilize technology and online platforms as the delivery system of instruction. Cerone (2008) posits, "most adults conceptualize learning as an instructor-designed and instructor-led endeavor that occurs in classrooms where students sit to learn from the "sage on the stage." (p. 138). We are asking teachers, adult learners, to shift that paradigm and create an online learning environment. We need to ensure teachers feel confident to lead learning in a remote environment. To support our teachers, we considered adult learning theories, including andragogy, to plan how to best support them in the transition: "These theories emphasize self-direction, flexibility, and the process of learning, rather than the content. They are learner-centered and recognize the importance of a customized approach to learning." (Cerone, 2008, p. 150-151).

INNOVATION

To account for the range of teacher abilities, lack of training time available, and need to simultaneously model expectations for students and teachers during the transition, the principal created a 'Model Remote Learning' class. This model class simulates the student experience for teachers and provides a professional development community tailored to teachers' individual needs as adult learners. Knowles (1984) contends that adult learners must be included in planning and evaluating their learning, see immediate relevance to practice, and engage in problem-centered learning.

We knew that our approach would have to focus on providing professional development and resources to support the broad spectrum of comfort with technology and knowledge of strategies for synchronous and asynchronous teaching and learning (See Table 1). We had already been working with Google Classroom, so we decided to use Google Classroom not only as of the instructional platform for our students but for teacher professional development as well. Research conducted by Reeves and Pedulla (2013) suggests "that more teacher learning takes place when OPD [Online Professional Development] content can be transferred easily to a classroom setting." (p. 62). Taking that into account, we decided to focus on pedagogy and instructional delivery over content area professional development. Knowles' (1984) research supports focusing less on content and more on the problem – the instructional delivery in this case. Curricular resources were not an immediate concern as we have a large variety of those available and in use.

Table 1

Participants

Teaching Staff	Teaching Experience (Range of Years)	Teaching Experience (Average Years)	Regular Use of Online Learning
10	1 – 20	7.1	4

The purpose was to create clear, consistent performance expectations for faculty as they transitioned to remote learning, as well as provide professional development through resources, modeling, and creation of an online learning environment. The Model Remote Learning class is a model for how teachers should set up their Google Classrooms for their students (See Appendix). 'Classwork' is organized by theme. Resources includes links to online tools for instruction. Professional Development Modules (See Table 2) includes webinars created by tech-savvy teachers as "how-to" guides. Additional resources include demonstration lessons created by the principal in Google Meet and archived, Google Slides and PowerPoint presentations with recorded audio to provide step by step instruction, and self-paced online learning modules; a Daily Teacher Attendance section for check-ins; Best Practices where model lessons created by teachers are shared as exemplars for their colleagues. The model lessons include a "live" component of either audio recorded presentation or video of teaching modeling application concept or skill, the task for students, and assessment criteria. A Google Forms survey was used after professional development sessions to gauge effectiveness and next steps (See Figure 1).

Table 2

Professional Development Offerings

Topic	Link to Resources/Samples
Google Classroom Basics	https://www.youtube.com/watch?v=CY_oyeg5UXk https://ddarbee.edublogs.org/
Intro to Remote Learning Model Classroom	https://ddarbee.edublogs.org/
Presenting Slideshows & Content in Google Meet	https://ddarbee.edublogs.org/
Project-Based Learning in Remote Learning	https://otis.teq.com/events/preview/13391 https://otis.teq.com/courses/category/type/1 http://www.blendeducation.org/p/getting-started-with-p-b-l-webinar https://xqsuperschool.org/xq-schools/xq-learner-goals
Text-Based Discussion in Padlet	https://padlet.com/dashboard https://www.edutopia.org/article/4-key-aspects-teaching-online-class https://inservice.ascd.org/5-essential-trauma-informed-priorities-for-remote-learning/

RESULTS

Feedback gathered from the teachers during professional development sessions indicates that the Model Remote Learning classroom has been effective in communicating expectations for what their online learning environment should include for their students. Additional feedback gathered through an email survey asking teachers to identify a strength of the model classroom and an area where they still needed support. This feedback highlights the ease of a centralized location for teachers to find resources and supports (See Figure 1). The teachers appreciate being able to check-in with the entire faculty and say "Good morning" on the discussion board. We continue to build on this strategy as we engage in remote learning to maintain support as we would in the physical school environment. This finding is supported by So, Lossman, Lim, and Jacobson (2009) who suggest a need to "provide open and emergent structure for participation and sociability." (p. 454). Teachers report that the modeling of voice-over presentations for asynchronous student interaction in addition to synchronous "live" instruction in Google Meet has been particularly useful in illustrating "face-to-face" interaction to maintain relationships with one another and their students. Teachers reported needing greater support in encouraging students to join synchronous instruction.
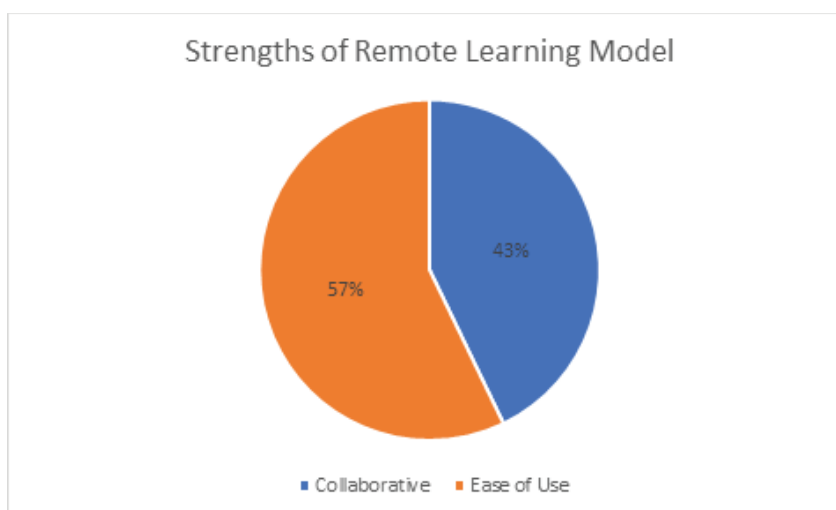
Figure 1. *Email Survey Results – Strengths of Remote Learning Model.*

IMPLICATIONS

Creating a model classroom as a professional development strategy for teachers is easily replicable in any online platform and is not limited to Google. For us, Google was in use and provided ease of access during the transition. A model classroom for teachers can be created in various ways to support the needs of school communities, including teacher teams, departments, and grade levels, depending on the configuration of the school. According to Prestridge and Tondeur (2015), "online professional development that is self-directed and not "product", "coursework" or "reward/certificate based", ensure participation in the learning and the development of autonomy as the outcome." (p. 216). Inclusion of teachers who are more comfortable with technology is also essential in this process. To create an impactful online professional development experience for teachers, "it is critical to involve teachers from the early stage of the design process." (So, Lossman, Lim & Jacobson, 2009, p. 454). A bottom-up process is more likely to engage teachers.

Encouraging the four teachers who had prior experience using online instruction and blended learning to share their expertise resulted in their colleagues leaning on them for support. This created a collegiality amongst teachers who did not have prior collaboration. One of the teachers created "how to guides" using screen recording software and shared these guides with other teachers who were struggling with creating both synchronous and asynchronous lessons. Having the guides accessible in the Model Remote Classroom also provided ease of use and accessibility for teachers who did not want to openly admit to needing this support.

One of the key pieces of our innovation was the modeling through Google Meet. Having teachers grapple with their level of comfort with video conferencing was necessary for us to move forward. Administration modeled vulnerability by keeping the camera on and talking through technical difficulties and new learnings with various online tools. The principal modeled screen share, online discussion tools, and how to create audio in power point slide shows. Teachers were encouraged to practice screen shares and presenting during these sessions. Google Meet sessions were recorded and posted in the Model Remote Learning classroom so teachers could access them at any time. Self-directed learning is supported by Knowles' (1984) theory of andragogy, so it was important to ensure these resources were available for teachers to revisit as needed.

In addition to a weekly professional development session with all teachers, optional Google Meet check-ins on two other days each week were offered. These check-ins were joined by teachers asking for support in implementing a strategy, lesson, or software. The check-ins provided a small group setting for teachers to learn more in-depth from each other and administration. Teachers structure their Google Meet sessions with students in the same way: one whole class session followed by smaller group sessions throughout the week to provide more targeted support to students. This indicates that the Remote Learning Classroom has been effective in modeling expectations for teachers and simulating the online learning environment that our students are experiencing.

FUTURE RESEARCH

Future research is needed into whether this professional development strategy leads to effective, sustainable pedagogical shifts with a positive impact on student engagement and achievement in remote learning. While teachers' feedback and preliminary findings indicate positive impact, a study geared at measuring impact on student achievement is needed to determine the overall impact of this process. An evaluation will be conducted through an anonymous survey at the end of this school year to determine the impact of this innovation on teachers' practice. This evaluation will inform future use of this innovation as we plan for next year, which will surely include some component of remote learning.

The future of public education is ever-changing in this environment. We continue to innovate and build on what is working in the remote learning environment to support our students. There is also a great need to continue to support our adult learners, our teachers, and build their capacity to transform instructional practices to meet the demands of the educational landscape of the future.

Figure 2. *Google Form – PD Evaluation & Feedback.*

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APPENDIX

Screenshots of Remote Learning Model Classroom

Welcome to our Model Google Classroom

Sections in 'Classwork'

Sample Lesson Shared in Best Practices

Professional Development Session

The 5-Phase Process as a Balancing Act during Times of Disruption: Transitioning to Virtual Teaching at an International JK-5 School

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Redesigning a drastically new approach for teaching and learning within grades JK-5 required immediate attention to all constituents' needs, including students, faculty, and parents, in order to maintain educational continuity in a functional and safe online learning environment. This work describes the 5-Phase Process designed as an action research-based, disruptive intervention to transition from the traditional, four-walled classroom into a virtual classroom, thus transforming learning experiences, routines, and perspectives in the Elementary School at the American Community Schools (ACS) Athens, Greece. This emergency shift occurred simultaneously with the professional development needs of in-service teachers, and was guided by research-informed best practices of virtual teaching, and effects of online learning for students between ages of 3-11, while bearing the state of emotional and financial stress of all constituents. While the 5-Phase Process is still in effect, preliminary results are shared, while implications for practice and recommendations for further research are considered.

INTRODUCTION

The American Community Schools (ACS) Athens is a private, large K-12 American International school located in Athens, Greece. The school has developed and implemented its own blended instructional methodology (called i²Flex) since 2013 (Avgerinou, Gialamas, & Tsoukia, 2014; Avgerinou & Gialamas, 2016a; Avgerinou & Pelonis, 2021). Moodle is the LMS that facilitates blended learning for Grades 4-12 along with a wide range of educational technology tools. Throughout this time, extensive, systematic professional development (PD) has helped these teachers to make the mandatory transition to (pre-)blended learning- and as of September 2019 to online learning (Grades 9-12).

The conceptual frameworks that underpin the i²Flex methodology and associated in-service teacher PD, while also guiding the design, development, delivery and evaluation of the school's Blended and Online Courses are:

- the Quality Matters course design standards and K-12 rubric (Quality Matters, 2016);

- the TPACK framework (Mishra & Koehler, 2009); and,

- the Community of Inquiry (CoI) Framework (Garrison, Anderson, & Archer, 2000)

As a result of this focused and sustained, school-wide effort, educational technology integration has become embedded in the school culture thus impacting not only those grades required to make the shift to blended/online learning, but also those who prepared students to make a smooth transition to such learning: the Elementary School (ES) JK-5 teachers (Avgerinou & Gialamas, 2016b; Gialamas & Avgerinou, 2015). Yet, with the exception of Grades 4-5 who receive basic training on blended learning, ES teachers typically are not trained to teach online (Archambault et al., 2016), nor participate in in-house blended or online PD when they join ACS Athens. Thus, once lockdown hit and remote emer-

gency teaching (Hodges et al., 2020) became the new reality, the ES with 41 teachers and staff, and 400 students was compelled to rapidly adjust using an unconventional platform which also led to a necessary pause and ensuing, informed pivot in the curriculum momentum (ISBE, 2020). Entering this unknown territory required a swift transformation of educational technology enhanced learning to virtual learning (Rogers-Estable et al., n.d.). A new process, aligned with the i²Flex school culture and its underlying frameworks had to be immediately designed to allow for educational continuity while clearly communicating the associated vision and steps. Five phases were identified with close consideration to the ease of communicating, and also accessing curriculum material via safe, and user-friendly platforms and tools which allow for age appropriate virtual experiences to be designed and implemented. As each Phase has unfolded, all constituents (students, teachers, parents) have been surveyed for feedback in order for the relevant adjustments to take place according to the school demographics by grade.

INNOVATION

During the pandemic, ACS Athens Elementary School had to swiftly move approximately 400 students between Junior Kindergarten and 5th Grade to an immediate virtual learning setting. The 5-Phase Process (Figure 1) was crafted within a collaborative, participatory action research (AR) design (Avgerinou & Gialamas, 2016b) by identifying our population's resources, teacher's instructional design needs and technology skills, and student body digital skills while keeping the school's mission and vision at the forefront. The 5-Phase Process where each phase was conceived as an AR intervention, was meant to provide all constituents --students, parents and teachers-- with a clear sense of direction at a time where nothing else was secure. Outlining clear and crisp phases was necessary to pave a path for all to navigate virtual learning with approximately a two-to-three week time frame built into each phase so the associated learning curve could easily adjust and scaffold to the necessary online needs.

The continuous collection of different types of data collected from all stakeholder groups, guided the development and progression of each phase according to their needs. Both formal and informal feedback in forms of teacher, parent and student focus groups and meetings per grade, surveys, emails, and anecdotal records of phone calls, together with student participation logs and evidences of overall student academic performance online, each assisted in making informed decisions that shaped the 5-Phase Process. In addition, the school shared parent communication in a daily, internal log called Virtual Stories, where information was consolidated and used for guiding next steps. Success stories were shared on social media to contribute to the collective knowledge of the larger community to implement virtual learning for young learners in an emergency context. Parent letters were sent out weekly or biweekly in an effort to keep the lines of communication open and transparent. Student voices were also accounted through surveys they completed via their daily assignments in a synchronous or asynchronous lesson.

Ongoing teacher PD was instrumental in shaping and supporting their understanding of online teaching, and elevating the requisite skills, particularly with synchronous teaching tools and techniques. Besides whole school training, grade level and specials' team meetings were held as a means to support grade level specific needs and even check in with individual members to provide emotional support where needed.

5 Phases Process Description

1	2	3	4	5
Phase – 1 Asynchronous Sessions	**Phase – 2** Asynchronous & Synchronous Sessions; Teacher Support	**Phase – 3** Asynchronous & Synchronous Sessions; Student Support	**Phase – 4** Asynchronous & Synchronous Sessions; Assessment & Grading	**Phase – 5** Asynchronous & Synchronous Sessions; Reflections
Process : Videos & PPT's	Process : Moodle & Screen-Free/Inbox Free	Process : Virtual Reteach Sessions, Language Support & Office Hours	Process : Evidence of work & Redesign Report Card	Process : Feedback & Take-Aways
Timeframe : Daily	Timeframe : 1 to 2 times per week minimum	Timeframe : Weekly	Timeframe : Ongoing	Timeframe : Weekly/Biweekly Surveys
Deliverables : Videos, Active Links, PDF's, Projects, etc.	Deliverables : Building community, review content & Teacher PD	Deliverables : Individualizing Student Support	Deliverables : Assignments meet the Standards	Deliverables : Data to support projections for future

Sophia Moros, Elementary ACS Athens 2020

Figure 1. The 5-Phase Process.

The 5-Phase Process of Virtual Learning

Phase 1 is the implementation stage of asynchronous virtual teaching which lays the foundation of CoI online with the added factor of the technology effects on the three presences and their outcomes (Rubin et al., 2010; Rubin et al., 2013). It begins with teachers emailing students with daily learning objectives in the core subjects where students are given opportunities to create a daily schedule to promote healthy routines for continued online learning. The core subjects assigned in Phase 1 included unit review skills to ease student transition to online learning. Daily powerpoints were emailed to parents (and directly to student emails in grades 4 & 5) along with prerecorded morning greeting videos by the respective homeroom teacher that outlined daily expectations. Every powerpoint included the bulk of the core curriculum standards and was intentionally designed to replicate the familiar learning that would take place in a given, regular school day, per grade. Teachers utilized Google Apps (Docs, Slides, Forms, etc.) and assigned core subject activities by creating worksheets, links to interactive games, and educational sites such as Mystery Science, Khan Academy, TedEd, demo videos for writing and much more.

In **Phase 2** synchronous learning begins in an effort to rebuild student-teacher connections and secure the relationships previously established in a classroom, as well as to support the emotional wellbeing of students. Moodle's synchronous interaction feature (the Big Blue Button/ BBB) was introduced taking into account ISBE's (2020) recommendations and guidelines regarding minimum and maximum times of engagement by each student in remote learning activities. The intermediate grades (3-5) showed greater speed of demonstrating these skills while the early childhood students (JK -2) needed to be divided into smaller groups for more review on digital citizen rules. Concerns regarding screen time were addressed among other design considerations, by introducing a Screen Free day mid-week (Duckworth, 2020) which built in time for students to work on asynchronous assignments such as writing, artwork, STEAM and Design projects, finish reading books, and much more.

As teachers find their online voices and reclaim their comfort zone in working with the TPACK framework (Mishra & Koehler, 2009) online, Phase 3 becomes possible (see Appendix A and Appendix B). This is in line with Archambault et al. (2014) who suggest that online teachers "need to have not only an excellent grasp of their given content area but also an appreciation of how technology and the online environment affect the content and the pedagogy of what they are attempting to teach" (p. 87). Bringing a balance between the synchronous and asynchronous sessions begins in this phase

where a solid framework and weekly schedule for homeroom and specials' teachers is established and allows families to connect to live sessions or visit pre-recorded sessions. Therefore, the basic framework for scheduling virtual courses is now complete and perceived as the main outline until the end of the school year. Additional student support sessions are introduced to equitably support students who faced hardships during these times or those whose parents were working and in need of intervention. These opportunities have included the following courses crafted for our student needs: Virtual Re-teaching Sessions (VR Sessions), ESL conversational courses, Book Clubs, Technology hours, Student Council Club time, Early Childhood language courses & Mind, Body, Soul courses to promote physical exercises parents can do with their children.

Moving into **Phase 4** weighs less on students and parents' shoulders as it primarily provides faculty time to work on Assessment, Grading & Reporting, plan for meaningful Parent Teacher Conferences, and create criteria for teachers to share meaningful feedback on virtual student learning (ISBE, 2020; Persichitte et al., 2016). The majority of these planning times take place during faculty and team meetings guided by administration.

Ending virtual learning with **Phase 5** requires collecting reflections from all constituents during the last few weeks of school (Avgerinou & Gialamas, 2016b). Teachers focus on conducting end of trimester assessments, collecting reflection journals, and preparing a final round of student surveys, while administration guides faculty and parents through final reflection surveys and feedback forms to gauge their perceptions of and overall satisfaction with virtual learning experiences at ACS Athens. The feedback collected here will inform us on our population's needs and how to best implement aspects of virtual learning in the future to promote individual growth and successfully support online teaching and learning. Should schools reopen, the above process for collecting feedback and end of trimester grades will continue in a face-to-face setting. Teachers will continue to send daily lessons via Moodle and email families who choose not to return to campus.

RESULTS

Our research findings thus far are in alignment with the literature in online K-12 (Berge & Clark, 2005; Barbour, 2019) regarding benefits such as higher levels of student motivation and engagement, expanded educational access, high-quality learning opportunities, increased educational choice and instructional flexibility, as well as administrative efficiency. Faculty confidence in planning, teaching and assessing online gradually increased with just-in-time, context-specific professional development. Parent satisfaction has been observed throughout the three phases despite their professed difficulty in providing some quasi online homeschooling with a very low degree of preparedness over a prolonged period of time under adverse circumstances. In terms of the ease in adjusting to each phase, thus far teachers and parents seemed to have found Phase 3 more challenging- mainly due to the introduction of the synchronous sessions, and the supporting technology tools. To date, student outcomes and skills do not seem to divert as much from the regular face-to-face delivery. Yet, the data indicates some newly acquired technology skills and abilities such as grit/persistence, adaptability, and leadership (Kirschner & Stoyanov, 2018) for all constituents which provide a new skill set to teaching and learning. Therefore, regardless of any emergency situation the elementary school as a whole seems more prepared to join the i²Flex/blended culture of the school in the future.

It is also important to note that at a time of so many unknowns the 5-Phase Process seemed to have helped both with the overall school climate, and the sense of community. Our data suggests that as the model unfolded, teachers were filled with comfort and understanding which quickly transferred to our student and parent populations as a sense of calmness. Once the community noticed the school moving forward in a sensible path, it became easier for everyone to remain positive, supportive, and focused on the academic track that was paved for student success during this challenging time.

IMPLICATIONS

As the old adage goes, *nothing is more permanent than temporary*, and as we all desperately wait for COVID-19 to be muted or cured, this pandemic has probably set the tone and revamped the way education will look forever, especially in elementary schools. Therefore, replicating the 5-Phase Process in any (international) elementary school with similar parameters and context could provide **students, faculty, parents** with the necessary guidelines, expectations and goals that could be achieved by all, thus blanketing the community with a sense of purpose, security and calmness.

In-service Teachers and School Leadership

Approaching the entire enterprise through a participatory AR perspective is necessary. Maintaining strong internal communication from start to finish is a must. Recommendations for the successful implementation of the 5-Phase Process by teachers and administrators follow below:

1. One should begin with clear objectives aligned with core subjects and present students with daily powerpoint lessons without necessarily replicating a school day teaching. The progressively low to high technology approach in support of online learning will allow the school to pick up momentum as teachers and leadership move through the phases (Konen, 2020).
2. An effective means to keep the school's moral high and vision united is to host weekly meetings with faculty and scheduled meetings with parents. It is necessary to coach faculty and parents to remain flexible. Through mainstreamed announcements from the principal's office followed by explicit outlines for each grade level expectations will unite teacher expectations and student engagement.
3. Keeping lines of communication open by providing weekly or biweekly parent letters about next steps is very important.
4. Maintaining strong and continuous communication among school leadership is necessary to align goals both vertically and horizontally between schools.
5. It is important to recognize everyone's needs are different and be prepared to support student learning needs with personalized sessions, both academic and psychological.
6. Collecting feedback in each stage from all constituents using similar comparable surveys along the way is another important recommendation. Feedback from ongoing quantitative and qualitative surveys and questionnaires is a guaranteed way to adjust the school's performance in a virtual learning setting. Data collection needs to be consistently analyzed in order to support design preparations in the event another emergency situation takes place, or extract some of the most useful elements of virtual learning so they can be implemented into the school year-regardless of a need cecil.r.short@gmail.com to move into remote teaching.

Teacher Preparation and Professional Development

According to Archambault et al. (2016) "Despite the call for a transformation of teacher education in the 21st century, surprisingly little has changed (p. 303)". Through the examination of K-12 online learning in field experiences provided by teacher education programs, their study revealed a "slow, targeted growth, particularly in contexts in which partnerships have formed between teacher education programs and K-12 online providers. However, while signs of progress are evident, significant work to move the field forward with re-spect to K-12 online teacher preparation remains" (p. 303). Indeed, despite the fact that K-12 online and blended education is still considered a relatively new field for practice and research (Hu et al., 2019), the need for relevant teacher preparation programs and professional development cannot be overstated.

Technological advances are here to stay, and crises such as the current pandemic only come to highlight the digital deficit not just in terms of supporting technology, or student skills, but also and perhaps most importantly as regards teacher perceptions, attitudes, and actual preparedness. Consequently, teacher educators need to focus on preparing education practitioners to understand that online teaching requires its own set of skills, tools, and teaching practices. They need to support pre-service teachers develop those skills and find their own online teaching voices while being research and theory informed (Hu et al., 2019). Adopting such theoretical and research frameworks as the aforementioned CoI, and TPACK, and working in alignment with quality online teaching standards and benchmarks as Quality Matters® or the OLC quality scorecard suite (Online Learning Consortium, 2020), or becoming familiar with such seminal theories as Moore's theory of transactional distance (1983) and appreciating how it may impact both instructional design and communication online, are manifestations of how teachers should rely on theory to inform their practice.

Online professional development for in-service teachers is equally important. Research informs us that typically this focuses on common challenges for online teachers, e.g. from the first day of school, to supporting online assignments,

and addressing online student concerns to helping with online academic study skills., etc. (Barbour, 2019a; Irvin, Hannum, Farmer, de la Varre, & Keane, 2009). Another significant research finding correlates high retention with teachers who complete professional development. (Hannum, Irvin, Lei, & Farmer, 2008). It is self-evident that in-service professional developers have a crucial role to play in introducing online teaching, in sharing best practices, in supporting teachers develop the requisite technology integration skills, as well as in assisting them to keep abreast with developments both on the online learning research and the educational technology fronts. The design of professional development in international schools in particular should take into consideration additional factors such as the education context of country where the school is located, the high mobility of the teachers, the PD decision-making mechanism of the school, etc.

FUTURE RESEARCH

Despite the fact the 5-Phase Process is still in effect, and data collection and analysis are also underway, a few strongly emerging research themes can already signpost the way to future work. The investigation of the long term effect of the 5-Phase Process on the elementary school culture and identity, teacher practice, student learning, and social-emotional outcomes is a research priority. Given that blended learning is embedded in the culture of secondary education at ACS Athens, to what extent has the current disruption transformed the ES culture into a blended one, and provided it with a stepping stone to facilitate future virtual learning opportunities? As far as teacher preparedness is concerned, how, and to what extent would an online teacher training certification prerequisite (Archambault et al., 2016) in teacher recruitment, impact the 5-Phase process? How, and to what extent the same prerequisite would impact in-house PD decisions? Would a systematic i²Flex(blended) PD program help develop ES teachers' understanding of the methodology as it applies to JK-5, with the view to smoothly extending it to virtual teaching if necessary? How can ES parents become successfully educated toward understanding the 21st century education frameworks and associated student skills (Kirschner & Stoyanov, 2018), so that they can better support our curricular decisions? What would all this mean for international school contexts with the idiosyncrasies of diverse cultures, and high mobility of teachers and administrators (Pelonis-Peneros, 2017)? And, finally, what would all this mean for the ES student in the short run, if a more age appropriate platform (e.g. Seesaw) was to be introduced? How would that affect learning outcomes and overall satisfaction with the online course (Rubin et al., 2010; Rubin et al., 2013)? What would the impact be in the long run for the ES student from both a perceived and actual learning, but also a social-emotional perspective and preparedness?

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PHASE 3 TEACHER'S GUIDE

ACS Athens
American Community Schools

ES Teacher's Guide to successfully meeting Phase 3 Expectations
- Synchronous Sessions
- Office Hours & VR Sessions
- Core Subjects
- Formative Feedback

3

Phase – 3
Student Support

Process :
Homework Helper,
Language Support
& Office Hours

Timeframe :
Weekly

Deliverables :
Individualizing
Student Support

GR 1 & 2	Daily Synchronous Sessions	Office Hours & VR Sessions	Core Subjects	Formative Feedback
Teacher Expectations	90-120 teaching minutes daily EX: 2 x 60 min 3 x 45 min 4 x 30 min per day	60 min M/T/TH/F EX: 2 sessions x 30min with 2 - 3 students max 1 sessions x 60min with 4 - 6 students max 1 sessions x 10 min with 1 student max	Math ELA Science	-Clearly stated objective - Learning engagement during BBB - Practice assignment or enrichment
Student Expectations	90 min	Mandatory Sessions for all - (students assigned to date and time) VR Session per teacher recommendation (students assigned to date and time)	- Class participation - Work submission - Digital Citizenship	- Evidence of understanding in work - Collection of data, assignments
Platform	Moodle BBB	Google Meets	X	Moodle BBB & Google Meets
Purpose	Provide real time connections and interaction between student to teacher & student to peer	Provide individual feedback and collect formative data on student understanding and progress	Instruction of one subject in a BBB session per daily session. Additional subjects shared through daily asynchronous PPT.	

The ES Virtual Trailblazer: What do you need to keep going from zero to hero?   22/5/20, 10:04 PM

The ES Virtual Trailblazer: What do you need to keep going from zero to hero?

Please answer this short survey regarding your current virtual teaching needs so we can provide customised, just-in-time support! Submission deadline: Sunday, May 10th. Thank you! Dr. Maria Avgerinou, eLearning Director

* Required

1. Email address *

_____

2. You teach *

Mark only one oval.

- JK
- K
- First Grade
- Second Grade
- Third Grade
- Fourth Grade
- Fifth Grade
- Music
- PE
- Art
- Technology
- Greek
- Arabic
- ESL

3. What are you mostly proud of in your skydive online teaching so far? *

_____

_____

_____

_____

_____

4. What is your biggest online teaching challenge so far? *

_____

_____

_____

_____

_____

5. What tech tools are you currently using in your teaching? Check all that apply. *

Check all that apply.

☐ Moodle's BBB for synchronous class interaction
☐ Moodle (for posting homework)
☐ Moodle (for sharing class material)
☐ Moodle (Calendar)
☐ Moby Max
☐ Google Slides
☐ Google Docs
☐ Seesaw
☐ Brain Pop
☐ Flipgrid
☐ Razkids
☐ Envision Math
☐ Google Meet
☐ Skype
☐ Zoom
Other: ☐ _____

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6. What support do you still need? Please check all that apply. *

Check all that apply.

☐ with technology
☐ with online teaching
Other: ☐ _____

7. If you need support with technology, please explain if this is an existing but hard to work w tool, or a new tool you would like to learn how to use. Please make sure you specify any Moodle features and/or other tools you have in mind. *

_____

_____

_____

_____

_____

8. If you need support with online teaching, please check all that apply: *

Check all that apply.

☐ Planning for online teaching
☐ Designing Flipped Learning Online
☐ Assessing online learning
☐ Sharing feedback online
☐ Designing activities that motivate/sustain student interest and focus
☐ Running effective BBB sessions
☐ Identifying good resources for online teaching
☐ Ideas for Screen Free Wednesday!
Other: ☐ _____

9.   Biggest Takeaway from teaching online thus far... *

_____

_____

_____

_____

_____

Use of ICT for Active Teaching and Learning in the Indian Government Secondary Schools during the Lockdown 2020

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The paper highlights the use of ICT enabled active teaching and learning by teachers and students in the COVID-19 lockdown period in some of the government schools (low resourced) in Eastern India. Some of these activities included participating and facilitating online WebQuests: creating online quizzes, discussing online with experts, using online collaborative tools. Other strategies included leveraging teaching and learning through online chat platforms in the low network areas and creating and presenting ICT enabled projects online across states. The teachers and students in these schools had prior experience of using ICT enabled project based learning under a large scale program and the teachers had undergone continuous professional development in meaningful use of ICT in secondary schools. Suggestions are made to integrate learners as producers' approach, foster agency in teachers through continuous professional development, and demonstrate WebQuests like activities to help teachers adopt constructive use of technologies in the lockdown period.

INTRODUCTION

The context of the paper is situated within a large scale program called Integrated approach to Technology in Education (ITE) (ITE Manual, 2013). Unlike other ICT based initiatives for the students of the lower Socio-Economic-Status (SES) where technologies are used for drill and practice and remedial work (Hohlfeld, Ritzhaupt, Dawson & Wilson 2017), ITE program offered students an opportunity to create their own ICT enabled projects within the curriculum topics (Charania & Davis, 2016). An Initiative of Tata Trusts (Philanthropy in India), ITE is implemented in government secondary schools (lower SES) in four states, reaching about 33000 students and 3500 teachers. Teachers are central agents in this approach who creatively adapt to poor infrastructure to design lesson activities which enable students to create their learning artefacts situated within the curriculum and their local context. Teacher professional development is continuous to facilitate implementation of ITE in classrooms and starts with a four months certificate course in the blended mode offered by a deemed university, Tata Institute of Social Sciences. In the course, the teachers develop critical understanding of meaningful and relevant use of technology in school education. Digital agency (Passey, 2018) is central to the ITE program and the student learning best resonates with Papert's (1991) and Jonasen (1999) claims that learners should be actively engaged in constructing artifacts using technology for constructing knowledge.

INNOVATION

In January 2020, for the first time since its inception, the students presented their ITE projects online at interstate level, with support from their teachers. In the month of March, 2020, when the COVID-19 locked down period started in India, ITE team at TISS launched an online series of webinars whereby the students and teachers independently participated in WebQuests "an inquiry-oriented lesson format in which most or all the information that learners work with comes from the web" (WebQuest.org) using their mobile devices at home. The teachers and students' engagement in the synchronous WebQuest was phenomenal and suggested leveraging digital agency (Passey, 2018) that ITE offered them in the pre-lockdown period. It seemed they used their competence, confidence and autonomy (willingness to participate, choosing their subtopics, projects and tools) in adapting with distance and other technology applications in the lockdown period. Teachers participated with enthusiasm supporting their students during the WebQuests. About 300 students and teachers participated in these WebQuests, however, this experience became an exemplar for many ITE and non ITE teachers and students to use distance technologies for project and problem based learning.

After the webinar in March, students and teachers volunteered to conduct such webinars for other students and teachers, showcasing how they made ITE projects using SCRATCH and Python in subjects like Math and Geography. The ITE team at TISS coached and prepared a platform for them to conduct such webinars across ITE locations. The WebQuest resources and guidelines are given in the table below.

Title	Description	Link	Contents
WebQuest 1- Communicable diseases	A three-day interstate ITE Web Quest (6 hours) on "Communicable Diseases" was organized by ITE Resource team at the Tata Institute of Social Sciences, Mumbai in collaboration with ITE teachers from Kolkata, Assam and Madrasah, West Bengal for students of class VII to X. The main activities in the WebQuest were students undertaking a web search, asking questions to the experts on the panel, making quizzes and participating in a synchronous quiz on Kahoot.	https://sites.google.com/view/iteWebQuest1-com-disease/	• Step by step instruction related to the WebQuest for the participants (students and teachers) • Manual for teachers to replicate the webinar and learning • Youtube link to a short video regarding the WebQuest

Title	Description	Link	Contents
WebQuest 2-Air Quality evaluation	A two-day (4 hours) Web Quest was designed for students of class VII-XII for them to research and compare the "Air Quality Evaluation" across districts and states. They conducted a web-search on AQI and in virtual groups plotted a graph depicting depleting AQI in multiple locations. The students then researched and presented reasons for AQI depletion and other environmental effects of locked down using Piktochart, spreadsheets, programming sensors using Arduino uno kits, scratch, posters etc.	https://sites.google.com/view/air-quality-evaluation	• Step by step instructions related to the WebQuest for the participants (students and teachers) • Presentation used during the WebQuest by the facilitators of the WebQuest to guide the participants
Sample ITE projects in the pre-lockdown and during lockdown period	Some of the projects made by the ITE students using different forms of technology.	https://youtu.be/hnsdm8Wa5QQ	1. Pre-Lockdown period. Webinar organized in January 2020 with ITE students from three states, Uttar Pradesh, West Bengal and Assam took part in the webinar along with their teachers on the topic, Role of technology in water conservation
		https://youtu.be/gtMPeXQ9DQk	2. Lockdown period. A project made by students of Kolkata using Mblock and Arduino UNO kit in the lockdown period.
		https://youtu.be/AJwrPQOpzOU	3. Pre-Lockdown period. This project is a video made by ITE students on changing the course of the Kopai river affecting the farmers in Reendanga (Kamla Kantapur), West Bengal.
Constructive teaching and learning with technology- Part 1	This course was offered to teachers in government schools. This enabled them to implement ITE. The objectives of the course are to develop critical awareness and a deeper understanding of the role of technology in teaching and learning. The course draws on contemporary like Digital agency, TPACK, ISTE, NCF 2005. This course is developed from the four month blended course in ICT and Education.	https://www.tissx.tiss.edu/courses/course-v1:TISSx+ICTC02+2020_C02_EN_001/about	• Objectives and introduction to the course • Description of course units and pedagogy
Constructive Teaching & Learning with Technology Part 2	The course delves into how teachers may use technology for continuous professional development with their peers by creating and managing a Community of Practice using virtual and blended platforms. This course is developed from the four month blended course in ICT and Education.	https://www.tissx.tiss.edu/courses/course-v1:TISSx+RTICTENC03+2019_C03_EN_001/about	• Objectives and introduction to the course • Description of course units and pedagogy

After the first WebQuest, interviews were conducted with seven ITE implementing teachers involved in the WebQuesst. The purpose of these interviews was to study the relevance of ITE implementation, the TISS course, and their pedagogies in teaching and participation in WebQuest in the lockdown period.

RESULTS

The interview data indicated that the experience and learning of technical skills, confidence and understanding of using technology for active learning in the certificate course and ITE project implementation during the pre-lockdown period helped them to teach in the lock-down period. Some of the interviewed teachers also supported other teachers in their schools to teach at distance. Teachers in rural areas used WhatsApp to communicate and distribute lesson activities and readings as video conferencing was not possible due to poor Internet connections. Most of the teachers interviewed used the WhatsApp groups with their students they had already created for sharing ITE projects just after the certificate course. Out of the seven teachers interviewed, three used active pedagogies in the online classes like whiteboard for discussions, conducted virtual project based learning for example, assigned small video making of science experiments at home, and posted on WhatsApp and School websites. The excerpts below from two of the teachers narrate the activity centered approach in their conducting of classes in the lockdown period. Both the teachers were ITE implementing teachers from a government aided school who completed the certificate course in 2017 (translated in English).

1. I am doing different projects with my students in this lockdown condition. Recently we have completed a project called a flying game on scratch. This is related to the geography subject and topic is atmosphere. ... Thereafter we are going to complete our syllabus in lockdown.
2. After teaching, I give them assignments related to real life experience ... Over Google classroom, the students are allotted definite problems and time to submit the given assignment. Students are more responsive online than the face to face regular classes and they solve the problem very quickly. Using the white board features, I use different colour pens to highlight the hurdles and I get an excellent result. I do not solve the sum for them, I call the students one by one and they solve the problem…

The interviews were conducted before the second WebQuest, and six out of the seven teachers interviewed participated very actively in the first WebQuest. Some of the responses from the teachers indicated that students enjoyed and actively participated in synchronous quiz, presented projects to audiences across states, researched on the given topics, and learned new technical skills such as creating an online quiz. Some of the constraints were network connectivity and understanding the languages used (Hindi and English) by the hosts.

The ITE implementation and the certificate course in the pre-locked down period allowed teachers and students to design, create ICT artifacts while creatively adapting with inadequate ICT infrastructure in government schools (Charania, Kaur, Paltiwale & Sarkar, 2020). However, it cannot be directly implied that all teachers who implemented ITE and took the certificate course will start teaching using an activity based approach in the distance mode. Only three of the seven teachers interviewed indicated using project based learning and other active engagement strategies in their virtual classrooms in the COVID-period.

IMPLICATIONS

Exploring activity based technology tools in the lockdown

Instead of heavily relying on online content and teacher directed videos, project and problem based learning pedagogies using WebQuests can be explored in the lockdown period. The teacher interviews indicated WebQuest allowed students' collaboration and active participation, critical thinking and deep conceptual understanding of concepts; similar findings are documented in the WebQuest studies (Alias et al., 2013). Problem and project based learning using technology makes learners more responsible and active in the learning process (Grant, 2002) it allows young learners to develop an understanding of new concepts in a real life context (Wirkala & Kuhn, 2011). Besides being rich in fostering problem and project based learning, the WebQuest in this study also demonstrated the complex integration of technology, content and pedagogy (Koehler & Mishra, 2006) and therefore an attractive tool for teachers to cover the syllabus in the lockdown period.

Building teachers' capacity in the lockdown

Providing teachers with direct and concrete examples of including technology in specific contexts may be helpful (Ertmer 2010) and will encourage teachers to use such platforms with their students (Nanjappa & Grant, 2003). Although teachers involved in WebQuests in this study had gone through rigorous professional development through courses and other activities, they were not all able to transfer this learning into active teaching in the lockdown-distance period. The WebQuests for students conducted by the university team served as useful demonstrations for them. Further, structured instructions and resources for the WebQuests (as in this table) for at scale dissemination with language and cultural adaptations by teachers can be encouraged.

Continuous Teacher Professional Development

A rigorous CPD for in-service teachers in ICT integration should not only enhance technical skills but constructivist ways of using technologies (Kim & Sharp, 2000) and a sense of agency in teachers empowering them to choose, design and use ICT resources in usual and unusual times. The certificate course curriculum provided in the Table can provide guidelines to integrate ICT in curriculum and pedagogy at both pre-service and in-service level.

Relevance of the ITE approach

Currently in India, the national and state digital platforms focus on online resources or content for students, but not much thought has gone into learners as producers of resources (LeaP, 2019). The project based learning approach of ITE should be integrated in the national efforts towards ICT in Education.

FUTURE RESEARCH

Comparative research is required to study the relationship between using ITE approach and professional development, and readiness and adaptability of teachers to use ICT for active learning in the distance mode. It will also be interesting to study the video recordings of the WebQuests to compare participation and artefacts created by the ITE students (government schools) and other private and elite schools' students in the WebQuests. This will also shed more light on the findings of Hohlfeld, et (2017) study on differential technology use across Socio-Economic-Sections in India.

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Virtual STEM+C Camp

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4+1 TEACH provides an opportunity for preservice teachers to complete a Bachelor's and Master's degree along with teacher certification within 5 years. 4+1 TEACH Residents complete an internship in lieu of student teaching. Funded by the Department of Education, one of the priorities of the program is to promote computational thinking education through evidence-based professional development. During the summer, our program provides an intensive week-long training in Computational Thinking Instructional Strategies and STEM+C professional development. The following week, Residents teach using these skills to K-12 students. With the pandemic we are migrating the STEM+C Camp to an online environment. Though initially challenging, this transition could actually be beneficial for the educational community by providing a promising alternative for our pre-service teachers to earn field experience, gain online teaching skills, while also providing academic enrichment for K-12 students. Keywords: *Stem+C, professional development, online learning, pre-service teachers, K-12 students, teacher preparation, academic enrichment*

INTRODUCTION

Transitioning the STEM+C camp to an online environment could be a promising alternative for our pre-service teachers (Residents) to earn field experience and gain online teaching skills, while also providing enrichment for K-12 students.

In the area of teacher preparation, one casualty of COVID-19 was the loss of field experience for preservice teachers. Providing the opportunity for our Residents to teach in the STEM+C Camp with K-12 students will help supplement their field experience, especially since they will be teachers in the fall.

Also, with districts planning contingency plans for online or blended learning for next year, STEM+C provides an opportunity for Residents to increase their skills in teaching in an online environment in the event school districts are mandated to go online in the future.

In addition, the STEM+C Camp will also provide enrichment for K-12 students. Researchers have warned about "summer slide" in which students lose academic gains during summer months (Kuhfeld, 2019; Petty, Smith, & Kern, 2017) which will most likely be exacerbated with COVID-19 leading to increasing academic gaps in their learning. We also target school districts that serve underrepresented populations which research has shown has a higher risk of losing academic ground during extended breaks (Lenhoff, Somers, Teneshof, & Bender, 2020; Lynch & Kim, 2017). Supplemental field experience, online teaching experience for Residents and the opportunity to provide enrichment to K-12 students were all motivating factors in moving forward with migrating STEM+C to an online environment.

The camp is two weeks long. The first week is dedicated to preparing the Residents in Computational Thinking and STEM+C and the second week is for the Residents to work with campers using these skills. Our camp plan entails five modules centering on Computational Thinking (CT) Principles for the 4+1 TEACH Residents and four CT modules for the K-12 Campers. There will be 10 Teams that will be led by Program Leaders. Program Leaders are Faculty and former STEM+C Residents. Each Program Leader will lead a team of 6 Residents. The teams are arranged by grade levels with some teams including more than one grade level depending on enrollment. Each Resident will be assigned 3 student campers (See Figure 1 for an overview). All of the modules will be accessed through our university's online platform, Blackboard.
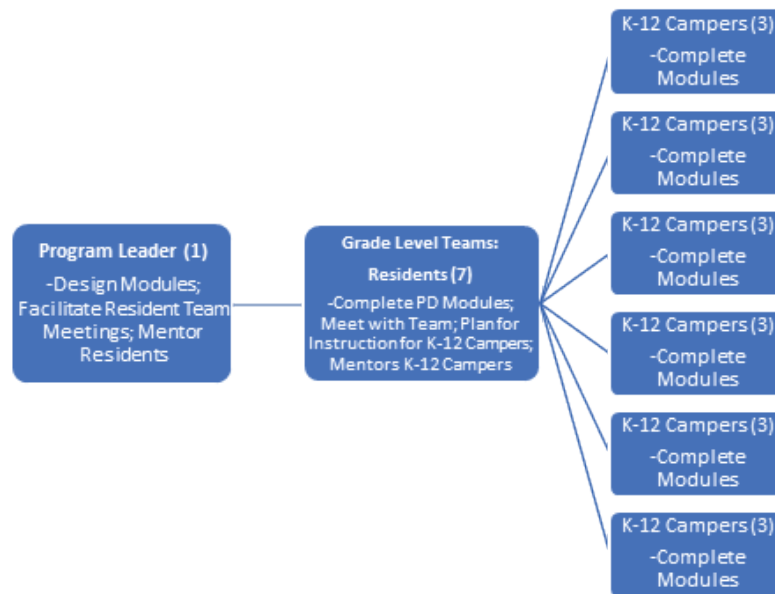
Figure 1. Overview of STEM+C Teams.

Professional Development for Residents (First Week):

During week 1, as mentioned, Program Leaders will be the facilitators of the professional development for the Residents. The program leaders design 5 modules; the Residents will complete one module each day: Computational Thinking Overview, Abstraction Module, Decomposition Module, Pattern Recognition Module, and Algorithmic Design Module. (Please see Resource 1 in the Appendix for an in-depth description of content.) As shown in Table 1, each module will have an overarching question, an introductory video, several readings and the development of a teaching product. The teaching product is a Screencastify video in which the Resident walks through an activity that can be completed by the K-12 Campers. (See Resource 3 in Appendix for teaching product rubric). There will be a common Zoom meeting time daily led by Program Leaders during which Residents will meet with their grade level team, share their teaching product with the team, and select the best one to use with K-12 Campers for the following week. Additionally, during the week of the 4+1 Resident Camp, program leaders will host synchronous office hours to assist 4+1 Residents.

Table 1

Modules for Residents

Modules	Components of the Module
Introductions & Computational Thinking Overview (Day 1)	• Overarching question related to module • Introductory videos of each topic • Readings (text, articles) • Development of a teaching product (Screencastify video of Resident walking through hands-on activity for K-12 participants to be used for following week in Campers' modules). • Zoom Grade Level Team Meetings (with Program Leader and Residents) • Program leaders will be available via office hours through the K-12 Summer Camp week to answer questions and offer support to the 4+1 Residents as they mentor the K-12 students
Abstraction Module (Day 2)	
Decomposition Module (Day 3)	
Pattern Recognition Module (Day 4)	
Algorithmic Designs Module (Day 5)	

STEM+C Camp for K-12 Campers

During week 2, the Residents will be the facilitators for the STEM+C Camp. There are 4 modules for the Campers focused on the following concepts: Abstraction, Decomposition, Pattern Recognition and Algorithmic Design. As shown in Table 2, each module will include an introductory video, teacher product video (Screencastify video created week before), optional hands-on activities created at the program level and a self-assessment rubric (see Resource 4 in the Appendix for a self-assessment rubric). Residents will check in with their assigned campers daily during which the camper will share their rubric and learning experience. A sample checklist for Residents to use in designing modules is located in the Appendix (see Resource 2).

Table 2

Modules for K-12 Participants

Modules	Components of the Module
Introductions (Day 1)	• Introductory videos of each topic that are geared toward their grade level • Top selected product video selected from each team (Screencastify video of Resident walking through hands-on activity for K-12 Campers) • Optional activities that are created at the program level by Program Leaders • Residents will check in with camper via Zoom call • Self-Reflection Rubric for Camper • Residents will be available to answer camper questions and guide campers through the various CT activities. • Program leaders will be available via office hours through the K-12 Summer Camp week to answer questions and offer support to the 4+1 Residents as they mentor the K-12 students
Learning About Abstraction (Day 2)	
Exploring Decomposition (Day 3)	
Fun with Algorithmic Designs (Day 4)	

RESULTS

Though our STEM+C Camp is scheduled for late June, we predict it will benefit the educational community by providing teaching experience for pre-service teachers, STEM+C instruction to K-12 students, as well as online teaching practice for pre-service teachers.

Alternative for Field Experience for Pre-Service Teachers

Preservice teachers lost the opportunity to complete field experience due to the pandemic. Field experience is a vital component to teacher preparation. In fact, the turnover rate is higher for those who have not completed a substantial amount of field experience as part of their teacher preparation program (Guha, Hyler & Darling-Hammond, 2016). Fortunately, the STEM+C Camp offers an alternative by providing an opportunity for our residents to work with K-12 students, while receiving valuable feedback by experienced Program Leaders.

Academic Enrichment for K-12 Students

Providing enrichment can help students in minimizing academic loss during extended breaks (Lenhoff et al, 2020; Bowers & Schwarz, 2018; Petty, Smith, & Kern, 2017) including in Science and Math (Green et al, 2011). This is important to note since STEM related careers are predicted to grow in demand, causing a stronger emphasis on STEM instruction during a time when there is a shortage of those pursuing STEM-related degrees (Francis & Stephens, 2018; Bottia, Sterns, Mickelson, Moller & Valentino, 2015). Early exposure to STEM learning can increase the likelihood that students will pursue STEM-related careers (Sisman, Kucuk & Yaman, 2020; Roberts et al, 2018), especially in underrepresented populations including women and minorities (Bottia et al, 2015; Roberts et al, 2018; Sterns et al, 2020) STEM education has been shown to foster creativity, build problem solving skills and critical thinking skills, which are all needed skills for the 21st century (Sisman et al, 2020; Pawilen & Yuzon, 2019). The STEM+C Camp will help build awareness, skills and interest in STEM+C for K-12 students.

Online Learning Experience

During the pandemic, many teachers were unprepared to effectively teach online, while districts scrambled to provide adequate resources and professional development to support their teachers. Furthermore, school districts and universities are preparing for possible blended/online learning options for the Fall. The STEM+C Camp provides practice for Residents to increase skills in delivering online instruction. We plan to assess the Residents, K-12 Campers as well as parents on the usability of the online tools for the STEM+C Camp and share this information with our faculty and school districts.

IMPLICATIONS

There are many factors to think about when creating an enrichment camp like STEM+C to ensure it is implemented successfully. Here are a few tips that will help you in planning.

1. Determine Your Focus:

Determine your content focus. Our camp is focused on STEM+C, but enrichment camps can but could easily be adapted to a Social Studies, Literacy or Arts camp using the same format but with a different content focus. Modules can easily be created using short videos, text and activities that demonstrate understanding. (See Resource 5 in Appendix for an example for History).

2. Plan for Participants:

As shared, our STEM+C Camp is for pre-service teachers and K-12 students, but the model can easily be adapted for other populations. Be proactive in identifying and planning for the possible needs of participants involved in the camp. For example, since our pre-service teachers will be delivering instruction to K-12 students, we have to think about what pre-service teachers might need to be successful including in the area of guidance, so we will ensure they have the support of our program leaders. Since it also involves K-12 students, we have to consider what they will need to ensure success by using "student" friendly terms they can relate to, clear expectations and regular check-ins with Residents.

3. Provide Clear Communication:

Determine how you will provide clear communication throughout the duration of the camp. For both professional development for the Residents and STEM+C Camp for the K-12 students, there will be a navigation video created by the Program Leaders (for the Residents' professional development) and by the Residents (for the K-12 camp). There will also be brief introductory videos at the beginning of each module that goes through the module components and activities. 4+1 Residents will be available to answer participants' questions and guide them through the various CT activities. Program leaders will be available via office hours through the K-12 Summer Camp week to answer questions and offer support to the 4+1 Residents as they mentor the K-12 students.

4. Determine Resources Needed and Accessibility:

Determine the technology platforms and applications that you will use in your camp. For our university, we have Blackboard Organization and are able to use it with both our Residents and K-12 campers. But since not all institutions have Blackboard, Google Classroom is a great alternative that lends itself for creating modules. It also provides teachers experience in using Google Classroom since many school districts have adopted this web-based platform for their schools. If you are unfamiliar with Google Classroom, there are many step-by-step videos that can be helpful in planning and creating your digital platform. Screencastify will also be used due to its user-friendly features. For students who do not have internet access, we will provide hotspots for them to check out so that they can actively participate in the camp. More and more districts are working with companies like Kajeet to purchase hotspots and using their media centers to check out devices and assign appropriate filters.

5. Measuring Effectiveness:

We will use several measurements including the *Technology Usability & Feedback Survey* (See Resource 5 in Appendix) that will be completed by residents, K-12 campers and their families t toward the end of the camp to assess the technology usability and effectiveness of the camp. Campers will also use a rubric to self-assess within each module.

FUTURE RESEARCH

As shared, we will implement the camp this summer. We plan to compare this online version to our traditional face-to-face to determine which format is more beneficial for future camps. For districts, it can help provide much needed enrichment during extended breaks for K-12 students. It can also help teachers increase their skills in online teaching. For teacher preparation programs, it can be a great alternative to field experience for pre-service teachers, providing opportunities to work with students while also receiving guidance and feedback from experienced teachers and/or faculty.

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APPENDIX

WEB-BASED RESOURCES

Resource 1:
Content Description for Modules
https://drive.google.com/file/d/1sFQbVW6eeUKDE2QOGslgzBGgn2I0-M3j/view?usp=sharing

Resource 2:
Checklist for Campers' modules to be used by Resident
https://drive.google.com/file/d/1X2Gh1rLwO34G6sZBaHYpKTrnP7P6yftx/view?usp=sharing

Resource 3:
Teacher Product Rubric
https://drive.google.com/file/d/1aU3MOtfXBafeeRTA6tv0PV9orEYG7aLl/view?usp=sharing

Resource 4:
Camper Self-Assessment Rubrics
-Younger Grades
https://drive.google.com/file/d/181_WDA_WsLetBhVSxijS6pW7rnv_vDaI/view?usp=sharing-
-Older Grades
https://docs.google.com/document/d/1PVZNU8F2Yhb3Z1fM9TSL5GkFY0q9TNlkneSlcVSLoGo/edit?usp=sharing

Resource 5:
Technology Usability & Feedback Survey for STEM+C Camp
https://docs.google.com/document/d/1hfsLEDM-qfZs_FMRFLvqgcH9KF37rFp9k80VwBqIoEw/edit?usp=sharing

Resource 6:
Example Adaptation for History
https://docs.google.com/document/d/19zACDI849IAcN49ZWOvq8I6eNHQ4bFNTe3JqFnAIJYU/edit?usp=sharing

Research-Informed Teaching in a Global Pandemic: "Opening Up" Schools to Research

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In the last decade, teacher research has grown in importance across the three i's of the teacher education continuum: initial, induction and in-service. This has been brought into even starker relief with the global spread of COVID-19. Now, perhaps more than ever, teachers need the perspective and support of research-led practice, particularly in how to effectively use Internet technologies to mediate and enhance learning, teaching and assessment online, and new blended modalities for education that must be physically distant. The aim of this paper is to present a number of professional development, open educational systems which exist or are currently being developed to support teachers internationally, to engage with, use and do research. Exemplification of the opening up of research to schools and teachers is provided in the chapter through reference to the European Union-funded project, BRIST, which is developing technology to coordinate and support teacher-research at a European level.

Keywords: teacher-research, digital education, transformative, professional development

INTRODUCTION

The current pandemic, COVID-19, has forced education in general to move online, underscoring the urgency of a research-informed and principled approach to remote education. Parents, teachers and teacher educators are currently exploring and researching alternative ways of learning online, including synchronous and asynchronous modalities.

Evidence-based practice in teacher education is now increasingly identified as a key priority in the improvement of educational standards and systems (Council, 2011; OECD, 2007; Tatto & Furlong, 2015). Citing Biesta (2007), McKenney & Schunn (2018) remind us that when we do *research on education*, we are also invariably doing *research for education*, reflecting the importance of purpose and empirical relevance to practitioners in conceptualising and enacting educational change and innovation. Indeed Sahlberg and Hasak (2016) have noted the importance of the different types of research in education: the 'small r' data extant in classrooms and schools, as a critical complement to what are typically considered the 'Big R' data that are gathered and published through traditional academic research, large scale studies and surveys (Sahlberg & Hasak, 2016). Currently, there is a dislocation between the two, with questions recently raised about the efficacy of research, and its relevance to education at all (Torrance, 2017; Wiliam, 2019).

Projects which aim to reduce the gap between research and practice will - it is hoped - enhance the professional profile and quality of teaching and education (Hammersley, 1993), and raise the relevance of educational research in general.

Considering their accessibility and availability, open educational resources (OER) represent a valued opportunity in this context (Cronin & MacLaren, 2018; Hegarty 2015; Hylén 2006).

There is international evidence of formative teacher-research become more established and widespread, including through bespoke OERs for teacher researchers (Baas, Admiraal, & van den Berg, 2019) and increased possibilities for pre-service and in-service teacher professional development (Misra, 2014; Murphy & Wolfenden 2013).

This paper presents a number of professional development open educational systems developed to support in-service teachers as they navigate the research domain and share their research. We highlight some of the platforms, and their signature design features, which can facilitate collaborative research and learning among teachers, schools and informal educational providers. The chapter concentrates particularly on the development of the European Funded Erasmus+ BRIST project.

INNOVATION

Advancing knowledge by unlocking and sharing research is a benefit for all. Currently, the Open Access 2020 (OA2020) initiative highlights the growing acknowledgement that research should and must be made generally available to the global community for the betterment of society and the benefit of all citizens. An example of this in the current, global crisis, is how leading journals (e.g. The Lancet) are making their research freely and widely available, in order to help solve the pandemic by expediting the development of treatments for COVID-19.

In the last decade a number of high-potential blended and virtual systems for open, online educational research platforms have emerged, which are being deployed to enhance the accessibility, shareability and usability of educational research, particularly among teachers and schools. In 2015, the Teachers' Research Exchange (T-REX) (http://t-rex.ie) portal was introduced, which enables both in-service and pre-service teachers, and other educational professionals in Ireland to come together to interact, collaborate, and learn from one another (McGann, Ryan, McMahon, & Hall, 2020). To better support professional judgement and expertise in classrooms and schools, the UK-based, international MESHGuides (Mapping Educational Specialist knowHow) https://www.meshguides.org, platform has been developed. It provides teachers and educators with access to highly-usable, informative summaries and exemplars of research-based specialist knowledge (Jones, Procter and Younie, 2015). In the European context, the Open Schools for Open Societies (OSOS) https://www.openschools.eu portal enables schools and teachers to share research-based innovations, thus helping potentially to diffuse and embed educational change and innovation. Technologies such as those provided by OSOS, T-REX and MESHGuides, Table 1, are supporting school teachers, educational leaders and researchers to jointly engage with and in research.

Table 1
Overview of teacher-researcher supportive platforms

Building a Research Infrastructure for School Teachers (BRIST) project	https://www.4teacheresearch.org/
An online research infrastructure designed in collaboration with teachers, which supports teachers' lifelong learning and professional practice through evidence-informed research and practice throughout their professional careers.	
MESHGuides	http://www.meshguides.org/
MESHGuides is an online teacher/researcher led, international, knowledge management system for teachers. MESHGuides are research summaries, updated periodically, written for teachers (and parents/carers), linked to the research giving rise to practical advice.	
Open Schools for Open Societies (OSOS)	https://www.openschools.eu
The Open School for Open Societies project (OSOS) provides innovative ways to explore the world, to inspire, to engage and to connect. It also supports the development of innovative and creative projects and other education activities. The Open Schools for Open Societies project has created a core network of a thousand schools that together form a hundred hubs in twelve countries.	
Teachers' Research Exchange (T-REX)	http://t-rex.ie
T-REX is an online social network for Irish teachers and other educational researchers, where teachers can connect with others with similar interests, discuss research, and collaborate on projects.	

The enforced wholesale move to online education and a need for teachers to establish pedagogically sound ways of using Internet technology, entails that they need online support to benefit from collaborative, shared educational expertise. The EU Erasmus+ project *BRIST: Building a Research Infrastructure for School Teachers* project is achieving this, through a professional platform utilizing mobile technologies and incorporating related processes and structures, to support teachers to engage with, use and carry out research (www.4teacheresearch.org/), Figure 1. The international reach and remit of BRIST enhances the work of T-REX, OSOS and MESHGuides for example and the comparative differences across the platforms are displayed in Table 1. BRIST is designed and will be developed through a series of 32 discrete activities which lie within 6 key outputs such as a scoping study, the development of a mobile app, in-service teacher training programme, multi-media scenario and case studies, Figure 2.
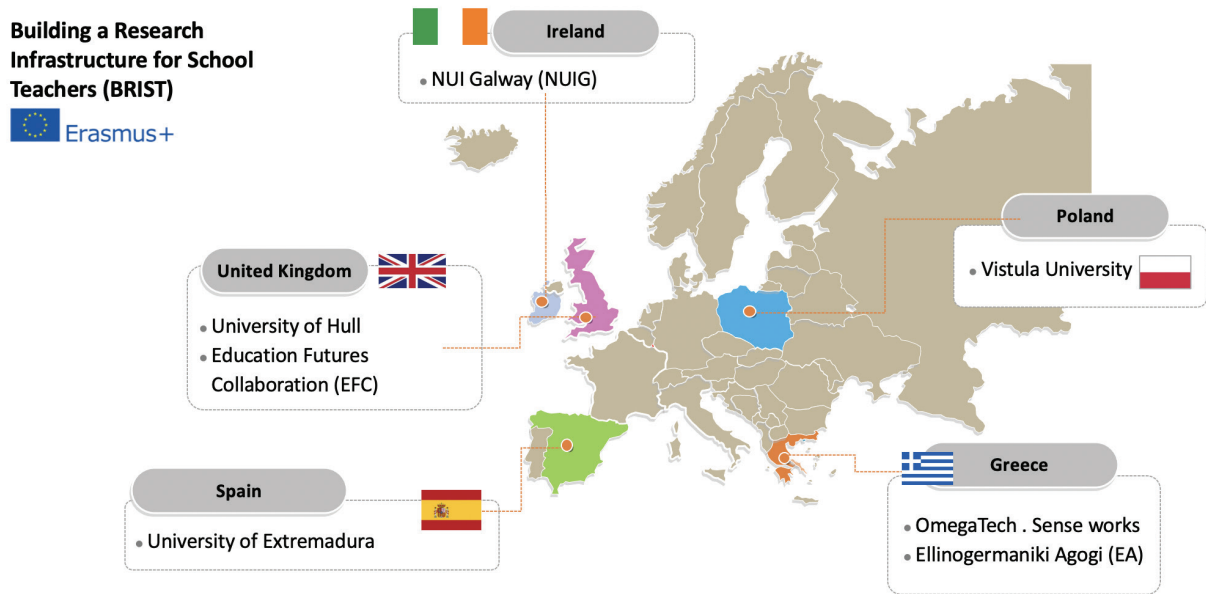
Figure 1. BRIST project partners.
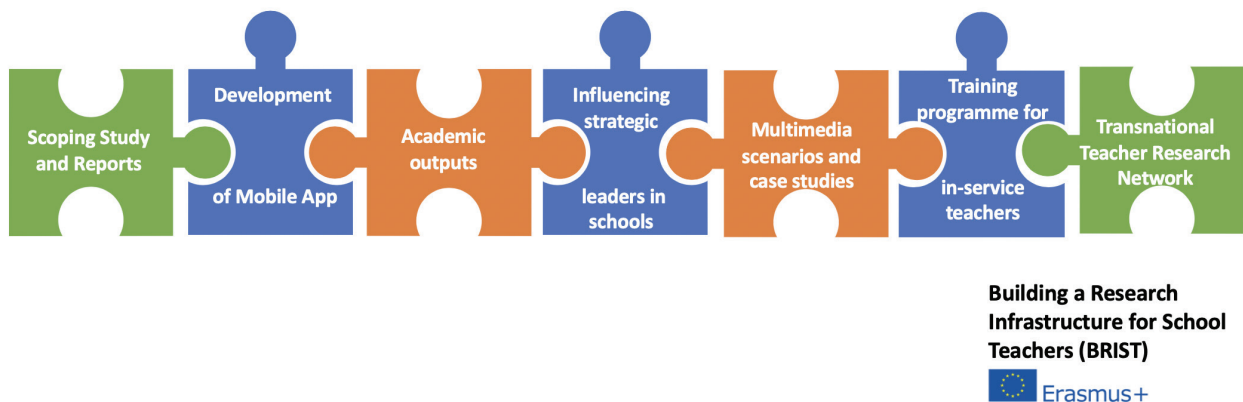
Figure 2. BRIST project outputs.

The key objective of BRIST, is to develop teachers into teacher researchers and evidence informed practitioners through a supported infrastructure. BRIST is developing processes and resources which themselves are evidenced-based, thereby giving back agency to teachers who will need to make use of and should be driving forward research in schools. The development of a network and supporting infrastructure for teacher researchers reduces the gap between research and individual teaching practice, thereby supporting teachers' agency to actively utilize research in schools. The BRIST project has developed an initial set of themes, derived from a systematic literature review (in preparation), which highlights the importance of certain factors influencing the ability of teachers to engage in research. These emergent themes can be seen in Figure 3.
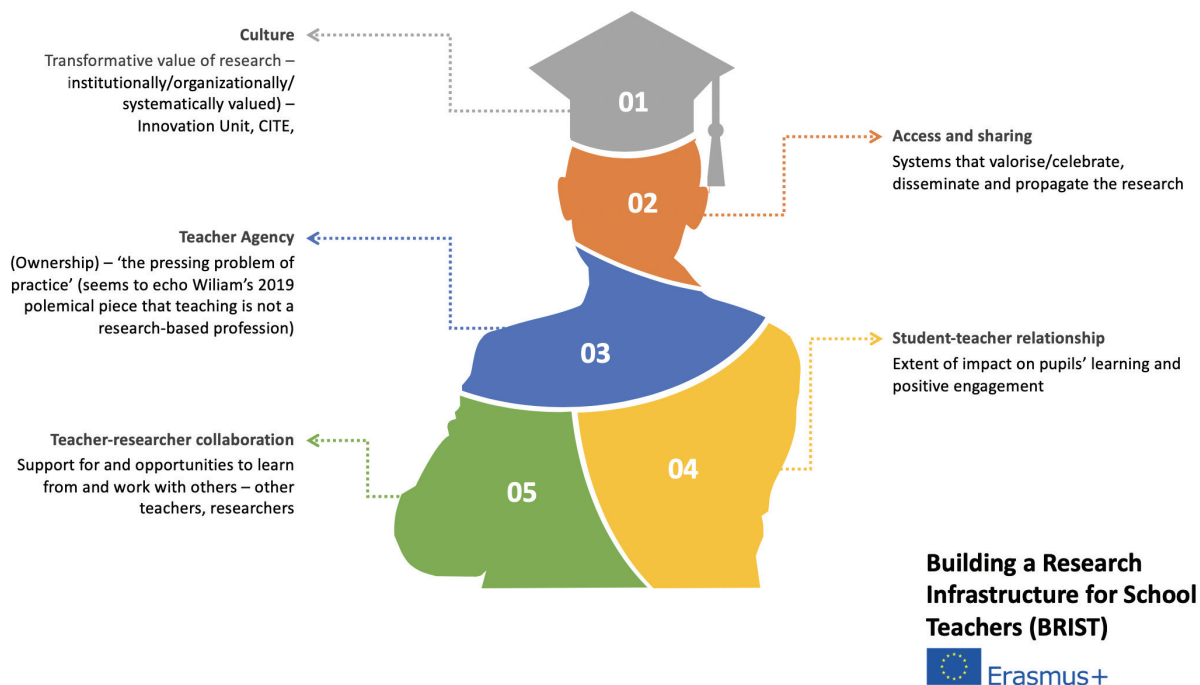
Figure 3. BRIST SLR emergent themes.

Perhaps the key theme to emerge is that of culture and the requirement for research to be valued by the school in a meaningful way. Linked to this is the notion of Teacher Agency where collegiality within the research process is not only needed, but central to the development of teachers' identity as a researcher. The theme of teacher-research collaboration challenges the notion that in education research situations, teachers are commonly viewed as passive participants (Cowie et al., 2010). Access and sharing are also core to influencing the ability of teachers to engage in research, with necessary infrastructures in place. Within the theme of student-teacher relationships, the importance of research relevant to student learning has emerged, with teachers being driven by potential positive effects on pupils' learning.

In the current pandemic circumstance, initiatives such as BRIST harness the power of digital technology to provide both usable 'bytesize' research content for teachers, but more importantly, enable participative and interactive communities to form so teachers and researchers can more easily carry out, share, access, utilize and benefit from evidence-informed research and innovation. in their practice. The design of a digital learning environment for research, and within this supporting the role of the teacher as a researcher in the current era, set amid the significant impact of technology on educational research and teaching today, is a primary challenge for the BRIST project. The project team are currently finalizing a stakeholder engagement process to support the findings of the SLR in identifying gaps in terms of the design of coordinated infrastructures to support teachers engaging with and using research.

IMPLICATIONS

Digital professional platforms in education are set to attract even more importance now given the wholesale disruption to learning and teaching as a result of the COVID-19 pandemic and this chapter highlights two important implications. The first is the use of OER research platforms. According to the 2012 OER Paris Declaration, OER is described as "teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions" (Pawlowski & Hoel, 2012). The established blended and virtual systems for open, online educational research, introduced earlier such OSOS, T-REX and MESHGuides, are deployed to facilitate collaborative research with formal and informal educational providers. OER benefits teachers as it is accessible, affordable, flexible, available and the intellectual capital is available on the platform for reuse. The sharing of knowledge and unlocking information benefits all. The potential benefits of open education and OER is being facilitated in the BRIST project which involves a wide variety of key stakeholders including teachers, educational researchers, school leaders, teacher educators, pre-service teachers, local, regional national policy makers, as well as international organisations, charities and institutions interested in translational research.

The second implication is the necessity for further research on how we can design technology supported OER infrastructures, to promote and support translational research in education and create an ethos of sustainable and valued research (Penuel, 2019). The BRIST team have identified a number of signature design features, which can help teachers to make effective use of research in their practice. Three design features highlighted are described in Table 2.

Table 2
Overview of BRIST design features

Design Feature	Example/Reference
(1) providing teachers with research-informed practice in attractive, digestible, and usable, bytesize formats	http://www.meshguides.org/ http://t-rex.ie
(2) innovative, accessible ways to share expertise, (including beyond traditional academic paywalls)	www.OA2020.org; Samberg, Schneider, Taylor & Wolfe (2018)
(3) leveraging the potential of technology to connect teachers and researchers in interactive, collaborative online research communities	OECD (2000); Schlager & Fusco (2003); Barab, MaKinster, Moore & Cunningham (2001)

FUTURE RESEARCH

In order to sustain educational innovation, systematic multi-stakeholder, multi-level partnerships are required in an inclusive manner which involves everyone needed to make the change happen, and in a context that supports them to achieve it. The BRIST project is being implemented using a Design Based Research (DBR) approach, guiding all phases of the project, including the collection of evidence to measure the impact on participants, participating organisations and other stakeholders. DBR is ideally suited to this project because of the principled, participatory, systematic approach which engages the diverse and dynamic variables that characterise universities, schools and classrooms.

OERs and teacher-research platforms are particularly important in our rapidly developing world where the current need to be more responsive in the way we develop pedagogies to engage and effectively teach students in schools is evolving. Furthermore, such infrastructure and tools position us to capitalize on opportunities that may be emerging to use learning technology in ways that, although socially distant, are close to the needs of teachers in the currently challenging and much-altered practices of education. The impacts and benefits of the project will be realized through the various dissemination channels and specifically will amount to the professionalisation of teaching through the development of teachers as researcher producers and evidence informed practitioners, thereby driving forward research in schools.

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Digital Tools

Digital Storytelling for Online Classrooms

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Digital storytelling is a tool that is familiar to many educators, especially those who teach Language Arts. During this time of mandated online learning, this tool can be beneficial to teachers of many subjects and all age groups as a way for students to express themselves beyond the proverbial discussion question. In a study with a New Literacies theoretical framework, preservice teachers in an early childhood education program used digital storytelling as a way of presenting creative writing pieces. Extending a creative writing assignment to include using digital storytelling platforms, such as Storyboard That, Animoto, and others, created an outlet for sharing during what can be categorized as an isolating time for students. The shift to include digital platforms as part of a writing assignment was so successful that it will be incorporated into future courses, including both online and face-to-faces classes.

INTRODUCTION

In March, 2020, college courses ground to a complete halt as schools in Georgia struggled to deal with the swelling COVID-19 pandemic. Our current third-year preservice teachers were in the middle of crucial methods and writing courses that would help to shape their skills in their future classrooms. In the vein of New Literacy studies (Gee, 2000; Sang, 2017), we considered the social contexts of our learners as courses moved to online instruction. Suddenly, their literacies became disconnected causing immediate frustration and disengagement. New Literacies Theory recognizes the need to consider the social practices and context of literacy events (Leu et al., 2017; West, 2019). Due to the change in our students' social practices we modified our assignments to include social interactions through our online learning system. One such modification included a particularly successful digital storytelling addition to what would have been an otherwise asynchronous writing assignment.

INNOVATION

Digital storytelling is a unique learning activity in which students transcend verbal or written summaries of books and content they have read. They move beyond literal retellings to creative approaches using visual and written elements, often along with digitized recordings of their own voices, to illustrate their analysis of plot, characterization, settings, and other elements within an educational setting. It can be used in multiple ways and in various contexts to increase comprehension, build engagement, and hone student writing and thinking skills (Liu et al., 2019; Shelby-Caffey et al., 2014). This type of activity increases engagement with the content (Hung et al., 2012; Larson, 2009).

As a part of an *Approaches to Writing* class in a teacher education program, preservice elementary education students explored various resources when engaging in best practices during writing workshops. As a part of the class, traditional and some scripted programs were explored as possible resources to use as a part of the writing workshop time. An important part of writing instruction is allowing students to have choice when writing creatively. In support of this

often-lost form of writing, we listened to a podcast based on Ralph Fletcher's book, *Joy Write*. The preservice teachers were given the assignment (See Figure 1) to write what Fletcher refers to as *feral* or *greenspace* writing. We first brainstormed examples of this type of writing such as comic strips, song lyrics, poetry, movie reviews, etc. We then discussed ways to present various low-stakes writing to their future students. We discussed then importance of creating teaching points to guide them through the writing process using a comic strip, for example. Once students are exposed to various low-stakes writing options their creativity will take over. According to Fletcher (2017), the playful, low-stakes writing leads to surprising, high-level growth. With the remainder of the semester transitioning to an online environment due to the pandemic, we considered ways to present these creative pieces of writing. It was decided to add a technology component to the assignment. The students would present these creative writing pieces using digital storytelling platforms. The following free platforms were suggested: *Storyboard That* (https://www.storyboardthat.com), *Animoto* (https://animoto.com), *Flipsnack* (https://www.flipsnack.com), Book Creator, (https://bookcreator.com), *WriteReader* (https://www. writereader.com/en), *ThingLink* (https://www.thinglink.com), *Pixton* https://www.pixton.com/), and *Powtoon* (https://www.powtoon.com). Before moving to online instruction, we explored ways to publish students' stories digitally; therefore, to use these platforms using their own stories was a smooth and logical modification to the assignment. Students were given three weeks to create their example of feral writing and publish it using a digital storytelling platform.

During our weekly check-ins, students discussed the digital tool they used. We added to the assignment a review of the digital storytelling platform that the pre-service teacher used. Since we were also meeting asynchronously, students created and posted their stories allowing the entire class to view the finished pieces of writing along with a review of the digital storytelling platform they used. Digital storytelling in the classroom is a powerful and beneficial pedagogical opportunity to teach and empower students with the potential to help develop academic skills and motivation in students (Larson, 2009; O'Byrne et al., 2018). During this shift to online instruction due to COVID-19, this online environment meant that the preservice teachers delved deeper into various programs and reflected on ways in which they can use these tools in their future classrooms during writing workshop instruction.

RESULTS

After presenting their creative stories, the preservice teachers expressed that the digital publishing platforms fostered creativity as well as engagement. Since experiencing these platforms, their eyes were opened to a variety of options to publish texts that students write. Publishing the texts in this way allows for an audience and stories that can be readily shared. Many expressed that while they were hesitant in the beginning due to their lack of technical knowledge that the platforms were very user friendly and were easy to navigate. They also recognized that using these digital publishing ideas can easily transfer to any grade level. Using these platforms that can be instantly shared will give students an audience and a purpose for writing. Engaging and exciting learning environments are created when digital storytelling integrates instructional messages with learning activities (Larson, 2009; Smeda, et al., 2014).

As shown in Figure 2, a student used *Storyboard That* to create a comic strip expressing his views on writing. Another student used *Animoto* (https://youtu.be/LmtX-VMaxeA) to create a story based on a response to a letter from his daughter. Another student created a *ThingLink* (https://www.youtube.com/watch?v=Qkdec86u9lU&feature=youtu.be) to tell a story about a fun snowy day. Students can express themselves and have autonomy in their presentation. This type of publishing can also lend itself to students working collaboratively while still working remotely.

According to the preservice teachers, advantages to using digital storytelling platforms include the ability for students to record themselves, seeing the finished product in book form, and that it is simple enough for the younger students to use but can be complex enough to make great examples of writing for higher grade levels. It was clear from the feedback that they appreciated the freedom they were given with their writing and their autonomy in how they were going to create their finished project. The preservice teachers began to think of the practical application of these formats and how they could be used when their students are writing how-to books and persuasive stories and hopefully future creative, *feral*, writing. Our findings are in line with Larson (2009) and Smeda et al. (2014) as digital storytelling personalizes students' learning experiences which provides for greater diversity of their learning.

Digital Writing Project Criteria
100 Points

Criteria:

- **Compose** a piece of feral or greenspace writing. Examples**:** creative story, song lyrics, poem, photo essay etc.

- Choose a technology tool that will **publish your completed text.** Be sure this is a tool you have not used in the past. Use the technology tools that were demonstrated in class. *If you find an additional tool you would like to use, please be sure to get approval from your instructor.*

  Publishing tools:

  1. StoryBoardThat: http://www.storyboardthat.com/
  Storyboard That is a graphic organizer and storyboard creator that reinforces English and history concepts in elementary school and beyond.

  2. PowToon: https://www.powtoon.com/home/
  Make videos in minutes with Powtoon. Use our library of styles, characters, backgrounds and video, or upload your own!

  3. Pixton: https://www.pixton.com/

  The world's most popular and easy to use comic and storyboard creator.

  4. Animoto: https://animoto.com/

  Turn your photos and video clips into video slideshows, quickly and easily.

  5. FlipSnack https://www.flipsnack.com/
  Fully mobile compatible, our digital flip book software makes quickly creating interactive brochures, magazines, catalogs and photobooks simple.

  6. BookCreator https://bookcreator.com/

  Book Creator is a simple tool for creating awesome digital books. Create your own teaching resources or have your students take the reins.

  7. Thinglink https://www.thinglink.com

  ThingLink interactive images help students develop 21st century skills and enrich their enthusiasm for learning.

  8. Write Reader https://www.writereader.com/en

  WriteReader is a scientifically-based learning platform that teaches children to read by writing their own digital books.

- Include the **step-by-step process** that you go through from idea to publishing. Consider pre-requisite skills you may need before beginning. You will take me through the process that leads to your final product. You will include **teaching points** that will enable you can take your future students through this same process. A mentor text will be provided.

- Your **teaching points** should include ways you can facilitate the steps of the writing process: Idea generation, Drafting, Revising, Editing and Publishing.

- Include a **review of the technology tool** you used to publish your piece. Address the following: pros, cons, ease of use. Did you have to create an account? Was there a cost? Did they offer free and paid options? How will using this tool benefit the students? What are some other uses for this tool? etc.

Figure 1. Digital Storytelling Criteria.
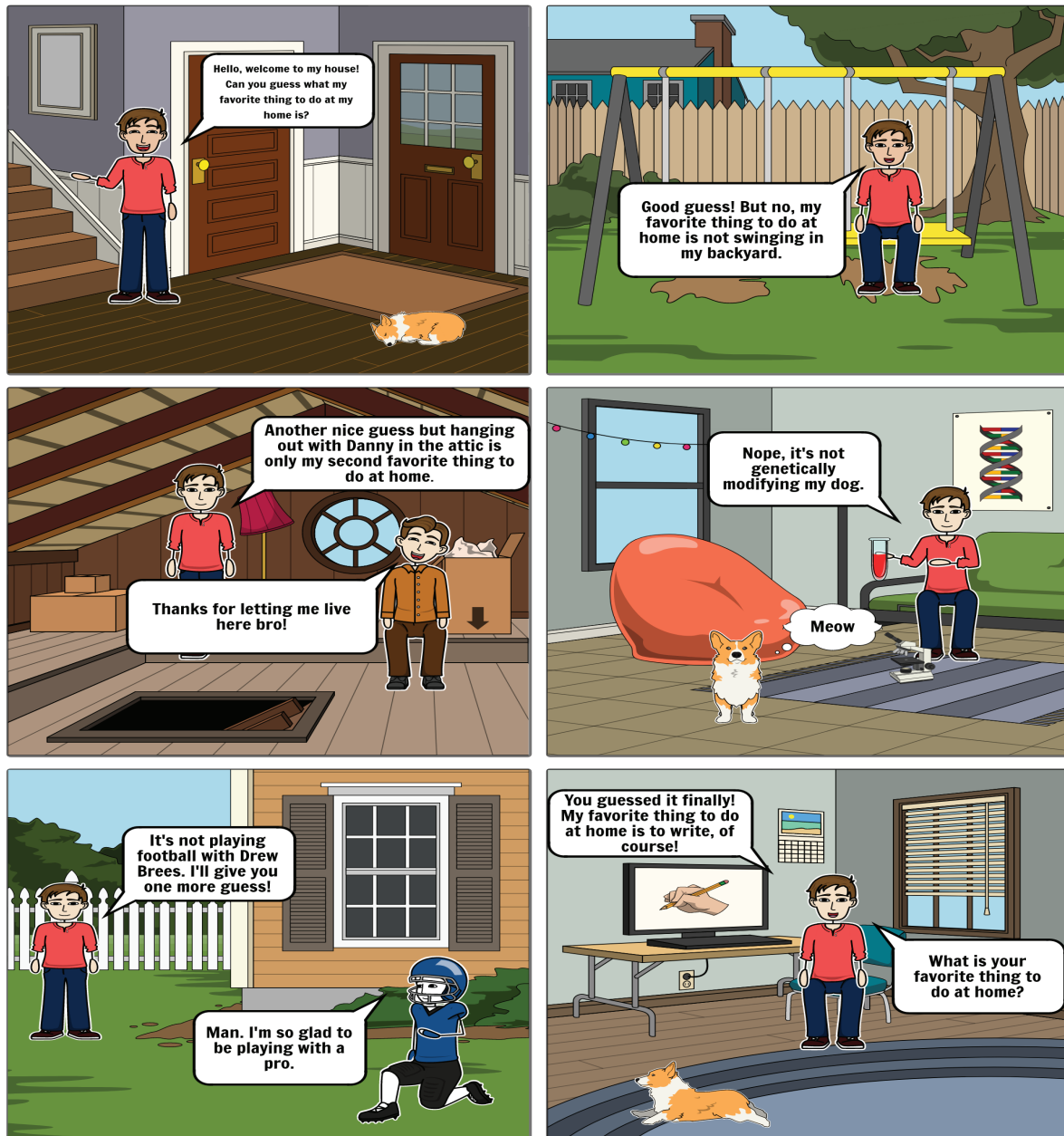
Figure 2. *Storyboard That* example.

IMPLICATIONS

This particular study points to several important implications for preservice and in-service teachers as it affects both classroom and virtual learning. The first big implication is that teachers need to use creative media and applications to reduce the loneliness and disengagement that students often feel when physically separated from their peers. In this study, using digital storytelling platforms engaged students and motivated them to write in multiple contexts (Yuksel-Arslan et al., 2016), such as poetry, letter writing, and book trailers. Findings in this study indicated extending a creative writing assignment to include using digital storytelling platforms created an outlet for sharing during what can be catego-

rized as a somewhat isolated time for these students. Shifting presentations methods of creative writing to include technology platforms is something for all teachers to consider. When making the shift, it was clear the presentation method was engaging and created more of a community as we shared our pieces and suggestions for use as we moved through process. Students indicated they were excited about using this digital storytelling platform to promote student learning with their future students (Shelton et al., 2017).

An additional implication of this study for both preservice and in-service teachers is that they must be digitally connected and they must know the media tools at their disposal. Gone are the days of multiple worksheets and vague discussion question posts and it their place are tools rich with social connection promises. We have found that teachers can work to build their own knowledge of these digital storytelling platforms through the exploration of credible websites aimed at teacher training, such as Google's Teacher Training Center (https://edu.google.com) and blogs, such as Free Technology for Teachers by Richard Byrne, that include several resources to support in-service teachers. Additionally, Twitter, a commonly used social media tool of like-minded educators can be used for keeping abreast of new tech innovations (Prestige). Following accounts such as Storyboard That (@Storyboard That), Animoto (@Animoto), Flipsnack (@flipsnack), Book Creator, (@BookCreatorApp), WriteReader (@WriteReaderApp), and ThingLink (@ThingLink) on Twitter provide educators with a plethora of informal professional development as support. In this "just-in-time professional development, teachers drive their own learning by pursuing the knowledge and resources that meet their needs." (Greenhalgh, et al., 2017, p.278). The teachers who are considered experienced use their professional learning networks through social media outlets such as Twitter as their first source for the consumption of resources (Prestridge, et al., 2019).

FUTURE RESEARCH

Digital storytelling has tremendous potential in the classroom, especially when working with groups of students who prefer social learning over solitary activities. It is our plan to integrate this versatile tool deeper into both preservice writing and methods courses so that they become more comfortable using this type of application. Though the New Literacies Theory is relatively new, it speaks well to the experiences that these students had with their literacy work at the end of a very challenging semester. As Sang (2017) states, "From the New Literacies' perspective, literacy is not only about printed and written text but should also take on new forms of representation" (p. 17). It is our hope to further research its use as an integrated literacy tool during a semester where face-to-face instruction is the norm. We would like to see if students would be as willing and as excited over its use in a regular classroom or if just the proposal of something new during a troubling time sparked their interest.

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Managing to Collaborate with Secondary Mathematics Teachers at a Distance: Using Storyboards as a Virtual Place for Practice and Consideration of Realistic Classroom Contingencies

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We describe how we further developed StoryCircles to support teacher learning online during COVID-19. In StoryCircles, a facilitator gathers teachers to collectively represent a lesson through iterative phases of scripting, visualizing, and arguing about alternatives. We share new innovations to the StoryCircles process that have helped us overcome common challenges, such as supporting teachers in anticipating elements of the lesson prior to implementation and intervening on teachers' learning with instructional practices that may be novel for the group. Our work has implications for teacher educators across the world who are committed to supporting teachers to learn in, from, and for the complexities of actual classroom practice but are facing the very real challenges necessitated by times of extreme societal disruption—having to cancel field experiences or offer teacher education courses in blended contexts.

Keywords: Practice-based professional development, Approximation of practice, Storyboarding, Multimedia-based Representations of Practice, Teaching Simulation, Lesson Study, Core Practices, Eliciting, Responding, Student Conceptions

INTRODUCTION

In this article we describe how we have further developed the Story*Circles* process (Herbst & Milewski, 2018) with a new innovation called *contingency cards*—enabling a group of inservice teachers to continue their collective work to develop and refine lessons in spite of being shut out of their classrooms due to COVID-19. Story*Circles* engages teachers in collaboratively designing and improving a lesson by creating storyboards that represent possible implementations of the lesson.While the Story*Circles* process draws crucial inspiration from other practice-based, lesson-centered approaches such as Japanese lesson study[2] (Lewis, Perry, & Murata, 2006), the Story*Circles* lesson revision process does not solely depend on classroom implementation. The storyboard medium—central to the Story*Circles* process—acts as a critical source of feedback, informing lesson revisions (like virtual microworlds such as MineCraft enables users to both see and assess their work, see Chen, 2012; Herbst, Chieu, & Rougée, 2014; Rougée & Herbst, 2018). The storyboard medium has also enabled us to ensure participants are confronted with realistic lesson contingencies—in spite of their absence from regular classroom practice.

INNOVATION

Story*Circles* builds on practitioners' knowledge by engaging them in collectively scripting, visualizing, and arguing about how a lesson that addresses a particular mathematical goal or uses a mathematical task could unfold within a particular instructional setting (Fig. 1). The ideas teachers contribute through scripting are depicted using an online

[2]   Japanese Lesson Study centers teachers' learning on the collaborative development and iterative revisions of a lesson (Morris & Hiebert, 2011).

storyboarding application. As scenes are completed, participants can reflect on suggested actions—contributing ways to continue the story or arguing for alternatives—continuing story construction by cycling through these phases. Story-*Circles* utilizes the affordances of storyboarding to create a space for virtual professional experimentation that can inform alternative actions (Milewski, Herbst, Bardelli, & Hetrick, 2018).

*P: participant; F: facilitator
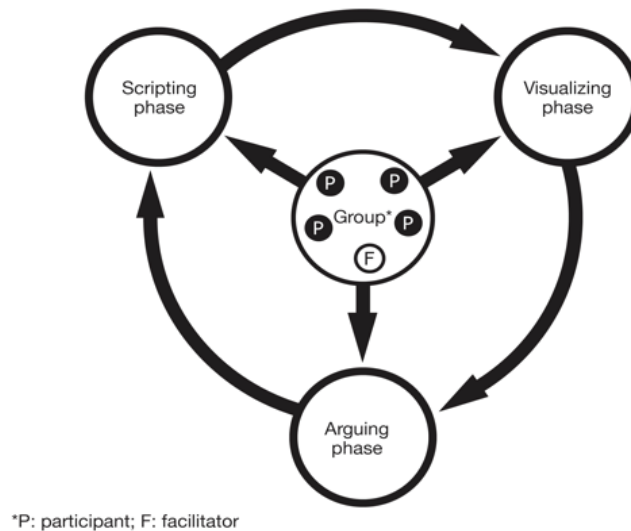
Figure 1. Model of the Story*Circles* process (Herbst & Milewski, 2018).

While we have facilitated Story*Circles* in face-to-face and blended contexts, the sweeping societal changes introduced by COVID-19 highlight the potential of Story*Circles* to run exclusively online. We recognize that an exclusively online format presents challenges for professional growth—teachers' production of storyboard frames may not contain enough opportunity for them to confront critical lesson contingencies. In the context of an ongoing project, we are using Story*Circles* to support teachers learning to use novel tasks to facilitate whole class discussions. For teachers new to this kind of practice, it is likely their production could suffer from a lack of anticipation (e.g., overlooking critical student [mis]conceptions) or intentional avoidance of certain contingencies (e.g., dismissing student work perceived as unrelated to instructional goals). We introduce an innovation we call *contingency cards* for overcoming these challenges. Our design of these cards draws on artifacts collected during actual classroom observations of these lessons (e.g., field notes, video, student work), research on students' and/or teachers' (mis)conceptions, and the learning goals outlined by the project.

In some cases, contingency cards are designed to respond to participants' needs. For example, in one Story*Circle* in which a group of secondary geometry teachers were designing a lesson for students to discover and prove the following: "For any right triangle, the midpoint of the hypotenuse is equidistant from the vertices of the triangle" (see Appendix, Fig.. A for task details), we noticed participants' initial storyboard drafts did not represent any student-to-student dialogue (Hufferd-Ackles, Fuson, & Sherin, 2004). To support participants' growth in this area, we designed cards featuring student-to-student exchanges—asking participants to propose what the teacher might have said to elicit those exchanges.

Fig. 2a. Purple critiques Blue's work | *Fig. 2b. Blue asks Lime a question*
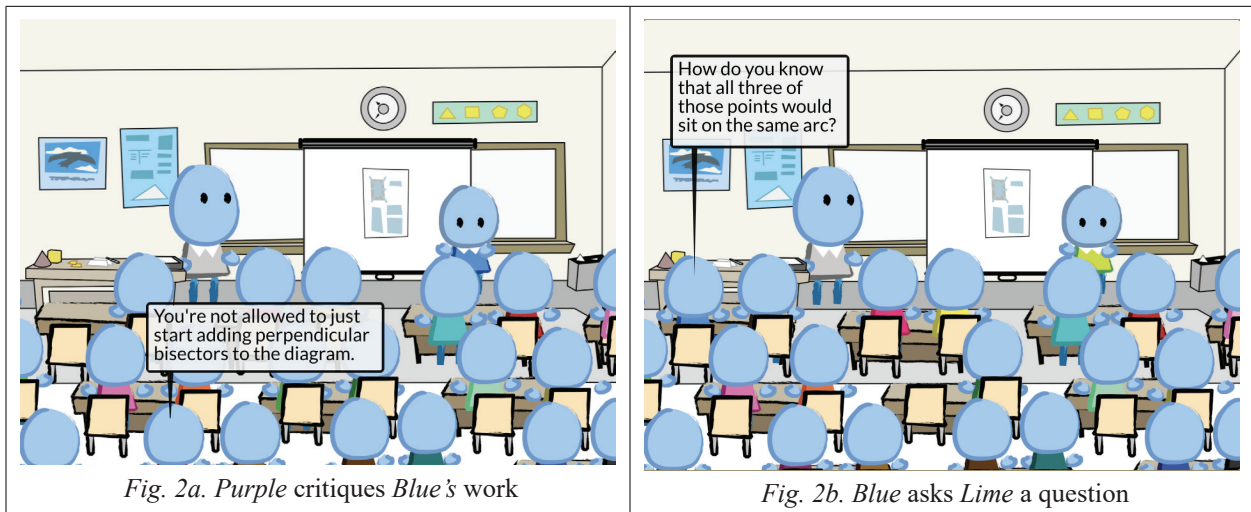
Figure 2. Two sample 1-frame contingency cards used to support teachers' thinking about how student-to-student dialogue could emerge in the context of whole class dialogue.[3] © 2020, The Regents of the University of Michigan, used with permission.

In other cases, contingency cards are designed based on research about teachers' instructional tendencies known to limit productive mathematical discussion. For example, prior research suggests teachers tend to overlook student work that does not comply with their expectations—even when that work could be described as correct and/or serviceable towards the goals of the lesson (Boileau, Herbst, & Milewski, 2020; Buchbinder, Chazan, & Capozzoli, 2019). In the context of another StoryCircle in which teachers were designing a lesson focused on using a diagram to reason about and prove the Pythagorean Theorem (see Fig.. B in the appendix), we designed cards representing a teacher selecting students with non-canonical approaches to present at the board. We asked participants to individually describe and then discuss the actions they would take following such a moment to ensure that participants had the opportunity to reason about (and perhaps find value for) a variety of student solutions.

Frame 1 | Frame 2
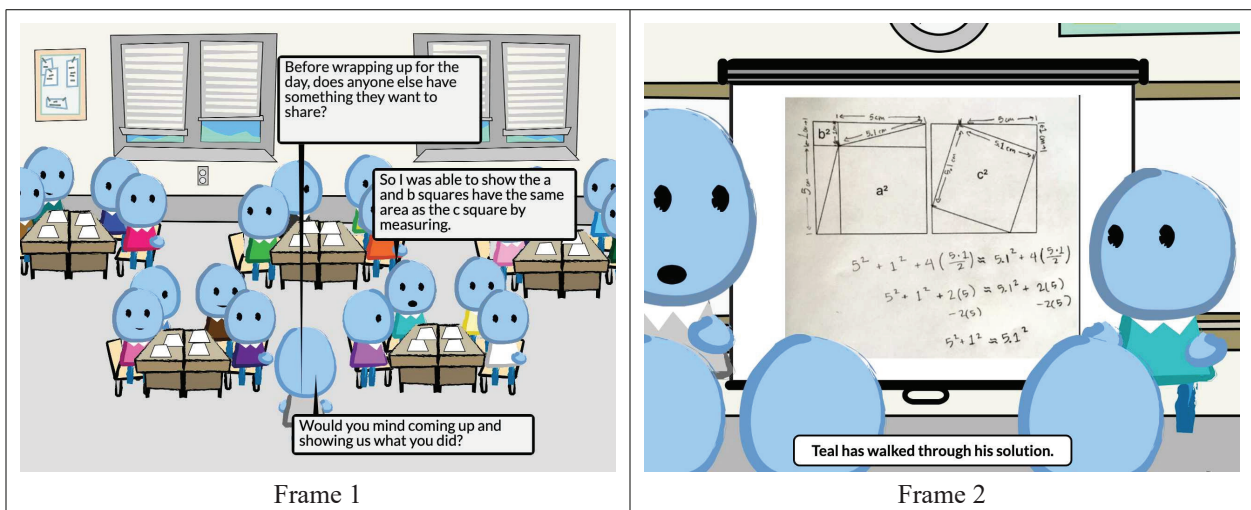
Figure 3. One sample 2-frame contingency card used to support teachers' reasoning about how to respond to a student that manages to arrive at a claim serviceable for the lesson goal using a non-normative (measuring a geometric diagram) approach. © 2019, The Regents of the University of Michigan, used with permission

RESULTS

We share data collected using the *contingency cards* described above from a group of secondary geometry teachers that began meeting online (every third week) in Fall 2019 and have managed to continue to meet up until the present moment (10 weeks into the Quarantine, May 2020). To date, teachers have made their way through three Story*Circles, each focused on a different* lesson.

In response to the contingency cards shown in Fig. 2, some participants suggested that the student-to-student utterance was preceded by a teacher's elicitation to the class (see Fig. 4a), while others suggested it was preceded simply by an utterance from the student at the board (Fig. 4b).

Fig. 4a. Participant depiction illustrating a teacher utterance that could elicit the student-to-student exchange

Fig. 4b. Participant depiction illustrating how a teacher utterance might **not** be necessary for the student-to-student exchange to happen
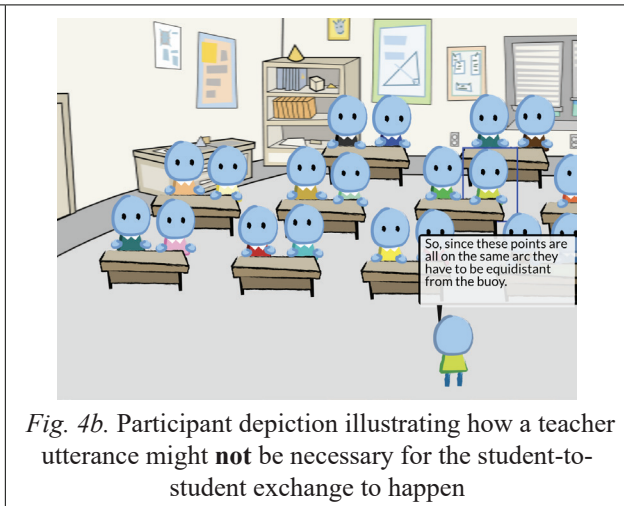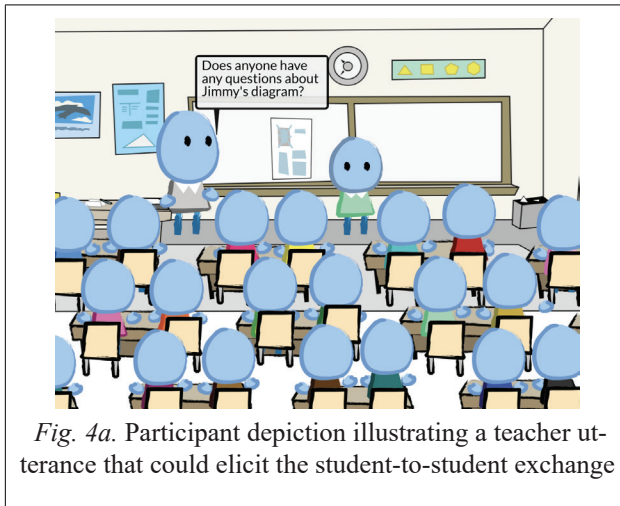
Figure 4. Depictions submitted by participants illustrating various ways the student-to-student dialogue featured in Fig. 2 could have emerged. © 2020, The Regents of the University of Michigan, used with permission

Following their individual submissions, teachers had the chance to view and comment on one another's suggested depictions—providing teachers the opportunity to consider various ways student-to-student dialogue might emerge. The discussion that followed provided teachers with the opportunity to collectively consider how various contingencies, such as classroom culture, might make the kind of spontaneous student-to-student utterances illustrated in Fig. 4b more and less likely.

In response to the contingency card shown in Fig. 3 and the prompt "What would you do or say next?," some participants suggested moving quickly past Cyan's work (see Fig. 5a), while other participants saw more potential for moving this work towards the goal of the lesson (see Fig. 5b). In the discussion of one another's alternatives, participants had the chance to engage in practical argumentation (Fenstermacher & Richardson, 1993)—providing them with the opportunity not only to consider various ways one can respond to the same piece of student work, but also the chance to reason together about the kinds of rationales that warrant one action over another.

"They are showing a really specific case and I wouldn't really want them to say more about that."	"[I would] acknowledge this work and ask if anyone has any ideas how to extend this further (to a general case with variables)."
Fig. 5a. One participant's reaction Cyan's work	*Fig. 5b.* Another participant's reaction to Cyan's work

Figure 5. Reactions submitted from participants when asked to describe actions they would take seeing the contingency card shown in Fig. 3.

IMPLICATIONS

Throughout this time of extreme disruption to schools, project teachers have remained dedicated to their collective work: the development and improvement of lessons. This reaffirms that a focus on lessons is not only crucial for supporting teacher learning in ways that are centered on practice, but also in ways that builds on the needs and interests of teachers. It also reaffirms the potential for storyboarding as a viable place to contextualize teachers' professional education. Moreover, the innovation of contingency cards ensures that teachers' engagement in virtual simulations of practice is subtended by the kind of sobriety that can come from professional experimentation in actual settings.

Our work has implications for teacher educators across the world who are committed to supporting teachers to learn in, from, and for the complexities of actual classroom practice (Lampert, 2010) but are facing challenges that necessitate cancelling field experiences or classroom observations. When access to K-12 classrooms is restricted, teacher educators can use storyboarding as a way to support teachers with lesson-centered work. Like our inservice teachers, pre-service teachers can be prompted to describe the ways in which they could elicit or respond to particular kinds of student work. By considering and discussing one anothers' suggestions, teachers can add alternative courses of action to their instructional repertoire.

A second implication of this work is that Story*Circles* enables teachers to learn from one another. After considering responses individually, teachers have the opportunity to learn about their peers' responses to student utterances/work, hear one another's justifications (learning about the practical rationality of their peers), and accept, refine, or reject various courses of action. In our experience using Story*Circles* with both inservice and preservice teachers, the simple act of formulating and listening to others' practical argumentations (Fenstermacher & Richardson, 1993) creates the kind of fertile ground where teachers can truly grow professionally by "deconstructing rigidly held convictions and taken-for-granted views upon one's own teaching, thus enabling the teacher to gain new perspectives on his/her own teaching" (Kroath, 1990, as cited by Fenstermacher & Richardson, 1993, p. 112). These implications are crucial for sharing with other teacher educators during this time and beyond as it suggests that our support for teachers' learning in and from practice can continue to flourish in spite of a limited access to brick-and-mortar K-12 classrooms.

FUTURE RESEARCH

As we continue to work on iterations of Story*Circles* with teachers, we plan to adapt the ways in which we ask participants to engage in lessons as we learn more about how the pandemic will impact learning in classrooms and on virtual environments. These adaptations could include representing how lessons are carried out in virtual environments in ways that take advantage of the virtual platform (e.g., students annotating and leaving text/audio responses to one another rather than engaging in dialogue in person) to support student-to-student discourse. We think it will be valuable to investigate whether teachers' anticipation of student-to-student discourse online is any different than their anticipation of student-to-student discourse in face-to-face lessons.

We recommend that others doing work in engaging with pre-service or in-service teachers in discussions around lessons consider ways that alternative representations of practice can be used to continue enabling teachers to learn in, from, and for practice (Lampert, 2010). The kinds of affordances we have described for storyboarding in general, and Story*Circles*, in particular, can be experienced through the use of one of the many freely-available storyboarding tools. In our own work, we have made use of the online Depict software application that can be found at www.lessonsketch.org. For those teacher educators experiencing challenges related to being unable to make use of more routine resources for supporting teacher learning, such as field experiences or classrooms, we recommend the use of one of the many online storyboarding tools for professional education during this time of physical distancing from students.

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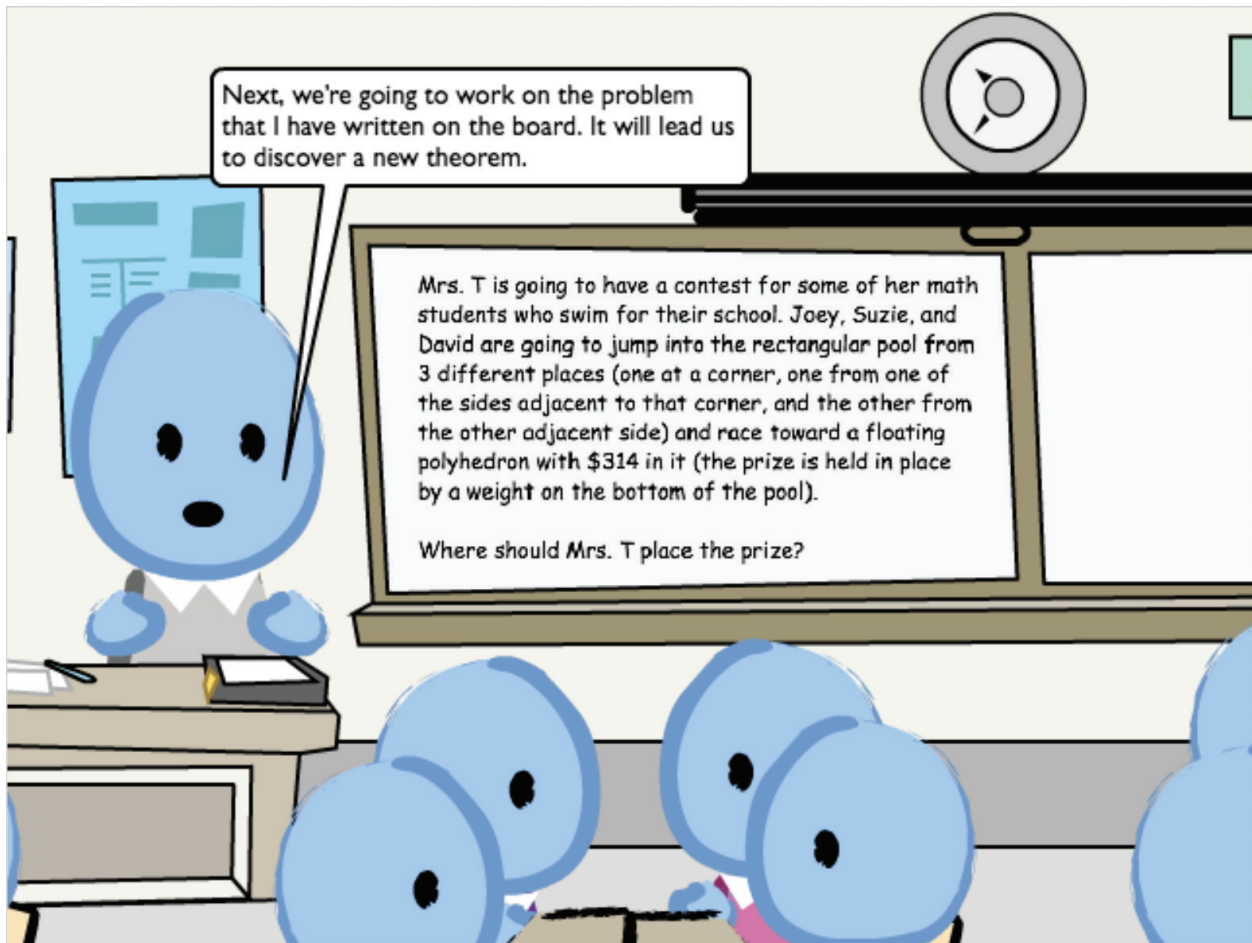
Figure A. An open task used in one of the Geometry Story*Circles* to design a lesson for supporting students to develop and prove the theorem "For any right triangle, the midpoint of the hypotenuse is equidistant from the vertices of the triangle". It was in the context of this Story*Circle* that we developed the contingency cards featured in Fig. 2 and share data featured in Fig. 4. © 2018, The Regents of the University of Michigan, used with permission.

Frame representing the beginning of the lesson launch

Frame representing a portion of the lesson launch in which the teacher plays the following animation: https://youtu.be/6Oj-PDQETbQ

Frame representing the question the teacher asked at the end of the launch, after showing the animation

One of the frames many teachers elected to use in their storyline to transition students' activity from construction of the animation to proof of the Pythagorean Theorem

Figure B. An open task used in one of the Geometry Story*Circles* to design a lesson for supporting students to reason about and prove the Pythagorean Theorem. It was in the context of this Story*Circle* that we developed the contingency cards featured in Fig. 3 and share data featured in Fig. 5 © 2019, The Regents of the University of Michigan, used with permission

Supporting Resilience through Meaningful, Digital Performance-Based Projects

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During this unprecedented time in education, discover one strategy to help students meaningfully connect to content and each other through a technology-based video performance assessment. Uncover how students can remain motivated, engaged, and connected to learning outcomes while simultaneously getting closure as the semester ends. Discover how projects such as this can be replicated to support future classrooms and/or learning formats by offering sound pedagogy, positive learning environments, and flexibility.

Keywords: performance-based assessment, technology, personalized learning, resilience, differentiation, motivation

INTRODUCTION

Survival strategies, triage teaching, however you choose to frame it, education has done an unprecedented pivot in these last months. Seemingly overnight, many classrooms moved to hybrid, online, or modified learning formats. Teachers are grappling with not only how to deliver instruction, but also how to engage, motivate, and support the social and emotional welfare of their students. It is during times like these that conversations of resilience surface. According to Suttie (2017), "How resilient we are may have as much or more to do with our social milieu and circle of support… as it does with our personal strengths" (p. 1). From previous research, we knew the power of technology regarding engagement and motivation, and were familiar with tools that were versatile, intuitive, and recognizable to both teachers and students. (McKeeman & Oviedo, 2013; McKeeman & Oviedo, 2015; McKeeman & Oviedo, 2016). Through this perspective we sought to help motivate and engage students in meaningful and relevant learning opportunities through a digital performance-based assessment.

INNOVATION

"Students want and need work that will enhance their relationships with people they care about," (Strong, Silver & Robinson, 1995, p. 12). Many teachers told students to have a safe and fun spring break, to later realize that that was their final face-to-face interactions with them for the academic year. Regardless of the setting, strong relationships can head off frustration and burnout while creating a safe space for students to learn at high levels (Souers & Hall, 2016). As the semester waned, many students still wrestled with the challenges associated with being abruptly dislodged from academic normalcy. This provided an opportunity to create a relevant, engaging, performance-based project that supported academic relationships cut short, while still connecting to learning standards and outcomes.

"The environments created when learning is offered through well-crafted digital technologies affords students the chance to engage in authentic learning, encouraging them to see these experiences as applicable in the "real world" (McKeeman & Oviedo, 2017, p. 47), and performance-based tasks offer valuable learning opportunities (Hibbard, Wagenen, Lewbel, Waterbury-Wyatt, Shaw, Pelletier, Larkins, Dooling, Elia, Palma, Maier, Johnson, Honan, Nelson, & Wislocki, 1996). The American Council of Foreign Language (ACTFL) created performance descriptors as a roadmap for creating performance tasks (Image 1).
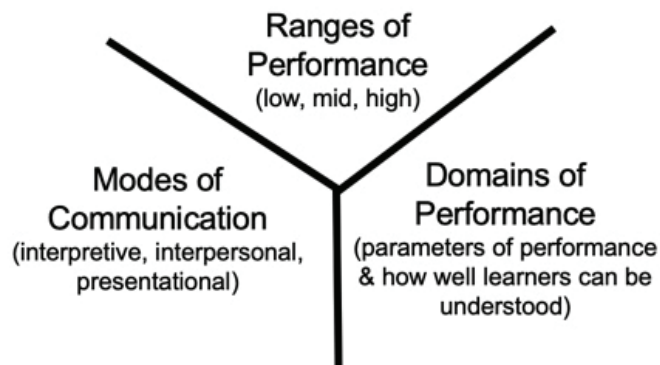
Image 1. ACTFL Performance Descriptors Overview.

Through these lenses, a digital performance-based assessment was created, intending to give students a voice while promoting meaningful and relevant communicative competence at a novice level in the L2 (target language). The "real-world" application of this project was a cornerstone in this assessment. Students had the opportunity to produce a two- or three-minute video monologue demonstrating knowledge of vocabulary and grammar over familiar concepts with simple phrases learned throughout the semester (Appendix A).

The project was conducted in a post-secondary hybrid Spanish 1 class. Students submitted videos in VoiceThread, a cloud-based online platform. VoiceThread was selected because of built in online tutorials, the ability to promote student engagement, and the ease with which videos (e.g. Animoto, Moovly, and Filmora) could be uploaded. Vocabulary and selected grammatical concepts from the course were used to deliver a personal message to an individual at the college with whom the student did not have the opportunity to say goodbye, or simply to greet someone with whom they had not seen since the coronavirus outbreak. In alignment with work done by Johnson (2008), micro-level relationships, ordinary, everyday 'little things' during school can be a source of significant resilience for students. To kick the project off, the teacher hosted a synchronous Zoom meeting with the class to initially unpack the project, go over the assessment check-list, and answer questions (Table 1).

Table 1
Digital Performance-based Assessment Checklist

Performance-based Assessment Checklist:
☐　Use content from each row within the heading in your monologue. (Where you are from, first & last name etc)
☐　Ensure that you address the person, professor friend, individual or someone you did not get to say goodbye or have not seen in the beginning of your monologue
☐　When creating your monologue ascertain that all grammatical concepts from the list given. (ie Ser y Estar) are included in your recording.
☐　Use vocabulary from textbook chapters.
☐　Apply creativity and enthusiasm into your monologue with a minimum of 4 slides
☐　With your permission, the VoiceThread monologue can be shared with recipient.
Project Submission through VoiceThread:
☐　Login to https://voicethread.com
☐　Create a VoiceThread account.
☐　Watch the tutorials
☐　Submit your VoiceThread- Project
☐　Email your link to XXX@XXX.edu

The VoiceThread and rubric were embedded on the school's Learning Management System ensuring immediate availability. Students created a personalized video monologue and uploaded it as separate slides to the VoiceThread that was then scored and shared as appropriate. The performance assessment criteria were divided into four sections; Greetings, Grammatical Concepts, Vocabulary, and Creativity (Appendix B).

In order to promote academic integrity, and avoid the use of translators, students were required to use vocabulary from previous chapters within the course textbook. Creativity was added to the rubric to encourage more imagination and expression, promoting autonomous learning. The assessed sections within the rubric offered a skeletal framework, reinforcing concepts learned throughout the semester without compromising creativity.

RESULTS

The assessment offered students an opportunity to reconnect, bringing closure to a chaotic disruption in the semester. Feedback received from students reported that this assessment was welcomed because it personalized a message that connected to a previously established academic relationship becoming a motivating force to complete the project, it was not considered busy work. This VoiceThread assessment was the embodiment of sincere student voice, conveyed in the L2 to friendships put on pause as they adjusted to a new normal of pandemic online learning, and successfully concluded the academic year. Student outcomes supported previous work with VoiceThread in that they strove to produce a more quality final project because they could hear and re-record themselves, and because this was intended for a real person not a hypothetical audience (McKeeman & Oviedo, 2013). It was noted that this project had higher grade point values and was completed by all students on time versus previous, more traditional projects. When used meaningfully to support instruction, technology can enhance engagement, support motivation and promoting success and resilience amidst a challenging semester.

IMPLICATIONS

The pandemic created an opportunity to re-frame how communicative competence and instruction are approached. While the context and situation surrounding the project will hopefully not be replicated, in the sense that a global pandemic forces classrooms to close and severs academic normalcy, the premise behind this project is highly relevant and replicable. Anticipating future school years, this experience has revealed that one never knows what can happen; prepare for the unexpected. Therefore, preservice and in-service teachers alike must look toward defining the next steps that can be taken to recreate resilience building digital performance assessments (Table 2).

Table 2
Steps and Strategies for Resilience building Digital Performance-based Assessments

Build Resilience
Be aware that each student has stressors that can impact their learning. So take the time to check in with students (socially/emotionally) so they can provide you insights you need to adjust learning experiences accordingly (Lew, 2018).

• Build insights through strategies like:
    o Discussion Board prompts where students can communicate how they are, what they need, etc.
    o Journaling/Blogging
    o Synchronous chats, like Zoom
 	
• Within this project:
    o Students were listened to and comments through emails and synchronous chats synthesized about how academic relationships were severed and recognized their need to reconnect.

Build Relationships and a Positive Environment
"…We shift from doing restorative to being restorative" (O'Shaughnessy, 2020, p. 1). This focused on things like creating a space where students feel connected to others, have opportunities for meaningful engagement, creating a class ethos, checking in on one another regularly, and focusing on the positive. A positive learning environment is undeniably one of the most important factors impacting student learning (Young, 2014).

• Build community through strategies like:
        ○ Icebreakers and other team building "games" – they work great for face to face or remote learning.
        ○ Be cognizant of interactions and how feedback is framed to ensure encouraging, positive exchanges, working to "build up" students.
        ○ Offering opportunities for spontaneous communication whether it be enabling the chat feature on the LMS or offering a synchronous meeting for those who need/want it.

• Within this project:
        ○ Students monologues were framed to help reconnect with others.
        ○ Constructive feedback was given that built upon their strengths and worded in ways to help them grow.

Build Performance Assessments
"The strength of performance assessments—and the source of their validity—is their authenticity. Performance assessments are themselves learning tools that can build students' abilities to apply knowledge to complex problems while also helping students develop co-cognitive skills such as collaboration, grit, resilience, perseverance, and a growth mindset" (Guha, Wagner, Darling-Hammond, Taylor & Curtis, 2018, p. 2).

• Build authenticity into performance-based assessments by:
        ○ Having students write/speak/perform to a "real" audience.
        ○ Create a context or prompt that is relevant and meaningful to that student.
        ○ When possible, have the assessment lead toward something (another real-world scenario/application).

• Within this project:
        ○ Students performance-assessment was of a monologue to a specific individual.
        ○ With permission, students' monologues were shared with the intended recipients.

Build Flexibility
"In this shifting education landscape, it is important to take perspective: not only to assess current practices and immediate agendas, but with an eye to the 'big picture' of the changed educational response taking shape in this terrain" (Ryan & Tilbury, 2013, p. 13).

• Build perspective by:
        ○ Taking stock and analyzing what students need right now. This "just in time" learning and meeting students offers valuable perspective for short term goals and decisions.
        ○ Maintain focus of course goals and outcomes. This offers a wider lens of what needs to be accomplished.
        ○ Plan for all contingencies. The more planning and preparation that is done ahead of time, the easier it is to pivot and shift instructionally to meet the needs of students.

• Within this project: ○ A more traditional speaking assessment was replaced with a more innovative task holding true to the same standards and outcomes, but meeting students "real time" needs.

Technology-based performance assessments as outlined in this project can offer relevant, rigorous, personalized, and meaningful learning tasks whether instruction is face to face, hybrid, or via asynchronous, remote instruction. In order for resilience to persist, relationships are paramount, pedagogical best practices are non-negotiable, and flexibility is key.

It is wise for teachers to think flexibly about how to design instruction and learning tasks to allow for contingencies that might arise. Just because an approach worked in the past doesn't mean that it will work the same way in the future (Shaw, 2017). Hopefully pandemics will stay at bay, but students will always have different learning needs and styles. Designing learning tasks that are variable and can be personalized offer valuable differentiation. "Differentiated instruction … in the context of a classroom system contains four interdependent elements: learning, environment, curriculum assessment, and instruction" (Tomlinson & Imbeau, 2010, p. 4). Projects such as this offer the chance to differentiate the process, product and content, while embodying communicative competencies in learners. Technology platforms like VoiceThread offer a springboard for students to demonstrate their understanding of content (interpretive communication), their ability to interact with others (interpersonal communication), and a place to share their thoughts, views, and/or perspectives with others (presentational communication). The context of these projects is what creates the personalized content needed to extend the reach of students' academic relationships.

FUTURE RESEARCH

As educators, we continually seek ways to develop, push our comfort zone instructionally, extend our repertoire of practices pedagogically, and challenge ourselves professionally. Projects like the digital performance-based assessment, offer the chance to adapt to instructional situations, offer relevant, meaningful learning opportunities, and connect students within a positive learning environment. What is known in the literature has been reinforced within this project. As education rebounds, normalcy may look new; therefore, projects such as this allow teachers to pivot instructionally, students engage meaningfully, and education remains relevant.

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Los Saludos	30 puntos	Greetings	30 points
Introducción incluye la persona		(Introduction, includes the person)	
--Tu Nombre, apellido, de donde eres		(Your name, last name where you are from)	
Menciona La fecha (mes, día y año)		{Name the date (month, day and year)}	
Un Adiós		(A Farewell)	

Gramática	45 puntos	Grammar	45 points
Ser y Estar		(The verb <To Be>)	
***Ir+ A+ infinitivo & Verbo Desear*		(**Expressing what you will do in the future)	
Saber y conocer		(The Verb <To Know>)	
Menciona tu familia o algún miembro de tu Familia		(Mention family or a family member vocabulary)	
Verbo en el Pretérito - (1) Verbo AR o (1) *Verbo ER o IR & 1 verbo irregular*		(Preterit Tense of a regular AR Verb & 1 ER o IR Verb & 1 irregular verb)	

What Latin American Country would you like to go or visit? Compare a similarity or difference from Your culture (Total 15 points)

Vocabulario	15 puntos	Vocabulary	15 points
Solamente usa el vocabulario de la lección preliminar y capítulos 1 al 4.		(Only use vocabulary from preliminary chapters and chapters 1-4.)	

Creatividad	10 puntos	Creativity	10 points
La imaginación es importante o otras aplicaciones para tu presentación. ¡Quiero que disfrutes creando tu proyectó final para la clase de español!		(Imagination is important or other applications for your presentation. Most importantly I want you to enjoy completing your final project for Spanish!)	

1. Your greeting/introduction **20 pts** (Where you are from, first & last name etc)
2. Addresses project to the person, professor friend, individual or someone you did not get to say goodbye or have not seen. **" 10 pts.**
3. Grammatical concepts from the list given. Gives a total of 5 examples, ie Ser y Estar in your recording.
   45 Total points (**Ir+ A+ infinitivo & Verbo Desear) . (15 points)**
4. Use vocabulary from the chapters. **10 pts**
5. Use vocabulary from Sol y Viento textbook chapters. **15 pts**
6. Creativity/Enthusiasm, **10 pts.**

APPENDIX B

Criteria	Ratings	Points
Uses Greetings appropriately (1. Converse in Spanish at Phrase Level)	This are will be used by the assessor to leave comments related to this criterion.	10 pts
Introduction- Self and video (3. Produce appropriate responses to Spanish aural input in highly predictable situations)	This are will be used by the assessor to leave comments related to this criterion.	10 pts
Applies Grammatical concepts (2. Write Simple Strings of Related Sentences). Ser & Estar, Ir + A, Saber o Conocer, La Familia	This are will be used by the assessor to leave comments related to this criterion.	20 pts
Compares similarity and or differences in culture **Ir+A+infinitive & Verbo Desear Latin American Country would you like to go or visit? (5. Compares a similarity or difference from his or her culture.)	This are will be used by the assessor to leave comments related to this criterion.	10 pts
Uses vocabulary from the chapters. 4. Simple written material applied from previous chapters.	This are will be used by the assessor to leave comments related to this criterion.	10 pts
Preterit Form of the verb- Uses verb in the pretérito AR, ER & IR y Irregular	This are will be used by the assessor to leave comments related to this criterion.	5 pts
Creativity	This are will be used by the assessor to leave comments related to this criterion.	10 pts
1.Converse in Spanish at Phrase Level	This are will be used by the assessor to leave comments related to this criterion.	5 pts
2.Write simple strings of related sentences in Spanish on familiar topics.	This are will be used by the assessor to leave comments related to this criterion.	5 pts
3. Produce appropriate responses to Spanish aural input in highly predictable situations	This are will be used by the assessor to leave comments related to this criterion.	5 pts
4.Comprehension of Simple Written Materials and expressions	This are will be used by the assessor to leave comments related to this criterion.	5 pts
5. Compare & Contrast Spanish Culture with Own Cultures in Spanish	This are will be used by the assessor to leave comments related to this criterion.	5 pts
100 Total Points		

Competencies
1. Converse in Spanish at Phrase Level
   Converse in Spanish at phrase level using everyday vocabulary and memorized   expressions.
2. **Write Simple Strings of Related Sentence cohesion**
    Write simple strings of related sentences in Spanish on familiar topics.
3. Appropriate Reponses to Spanish
   Produce appropriate responses to Spanish aural input in highly predictable situations.
4. Comprehension of Simple Written Materials and expressions
   Demonstrate comprehension of simple written material in Spanish through speaking, writing or other appropriate response.
5. Compare & Contrast Spanish Culture with Own Cultures in Spanish
   Compare and contrast aspects of Spanish-speaking cultures with their own culture.

We Came to See, Then We Saw: A Reflection of One School's Experience Using Seesaw for Online and Remote Learning

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We reflect on one school's experience facilitating online and remote learning using Seesaw with early child-hood and elementary learners that, in practice, has been successful in recent weeks during the COVID-19 pandemic. We first review relevant literature in online and remote learning including its suitability in K12 settings, and then describe the school's online and remote learning program. This is followed by a summary of early feedback from teachers and parents, which has been mostly positive after some early skepticism and uncertainty. We conclude with suggestions for schools and potential directions for future research as our society continues to respond and adapt during these unsettling times.

INTRODUCTION

Prior to COVID-19, online and remote learning (ORL) with K12 students was limited (Schwirzke, Vashaw, & Watson, 2018). K12 teachers may have been hesitant to incorporate ORL because ORL has not been integrated into most teacher preparation programs (Larson & Archambault, 2019), and therefore do not have effective models of ORL to draw upon when creating their own instruction (Britzman, 2003; Danielewicz, 2001; Lortie, 1975). Schools may also be concerned about time demands ORL places on teachers, professional development needs, and potential lack of student participation online (Farmer & West, 2019). We describe how one elementary school overcame these concerns by providing in-service teachers with support for providing ORL.

Our theoretical framework for ORL is comprised of a number of recommendations found in the literature. A mix of synchronous and asynchronous content may be optimal, because fully synchronous content lacks flexibility and accessibility (Journell & Schouweller, 2019). Ward-Jackson and Yu (2019) also suggested that teachers help young learners acquire self-regulation and autonomous learning skills, in addition to recommending teachers interact with students regularly. Journell and Schouweller (2019) suggest ORL courses be well-organized, accessible, and have a consistent structure, so students can easily access information. Additional considerations include ensuring learning is varied, meaningful, and authentic (Journell & Schouweller, 2019). With these recommendations in mind, we present one school's effort to implement a developmentally appropriate ORL program as a result of COVID-19 school closures.

INNOVATION

With face-to-face instruction cancelled until fall, teachers at ABC Elementary School transitioned to ORL in grades junior kindergarten through 4th. Luckily, nearly all families in the district had access to reliable internet and appropriate devices. Local charities helped provide devices to children who needed them. The school selected Seesaw, a digital portfolio and family communication technology, as the platform to deliver ORL. Seesaw has a number of affordances; however, the most interesting were features that allowed teachers to create assignments for students to complete and return for feedback, an important element of quality online courses (Archambault & Kennedy, 2018; Johnston, 2007).

An important first step for teachers transitioning to ORL is preparing them to teach in ORL environments, including a focus on specific instructional strategies and teaching considerations (Archambault & Kennedy, 2018). Although many teachers at ABC Elementary had used Seesaw to communicate with parents, most had never used the tool for ORL. Teachers completed two weeks of sustained professional development, attended multiple workshops with district technology integrationists, worked collaboratively in grade level teams to develop instruction, and independently practiced using the Seesaw app. Teachers limited instruction to key content needed to prepare children for the next school year. The result was weekly required lessons consisting of one or two activities in each content area (Ward-Jackson & Yu, 2019). Asynchronous lessons were designed to help parents facilitate their child's learning when needed. The typical design included a brief video followed by instructions for authentic activities completed both within the Seesaw platform, but also using other digital and non-digital technologies, such as Flipgrid, Google Docs, and paper-based materials (see Figure 1 & 2).
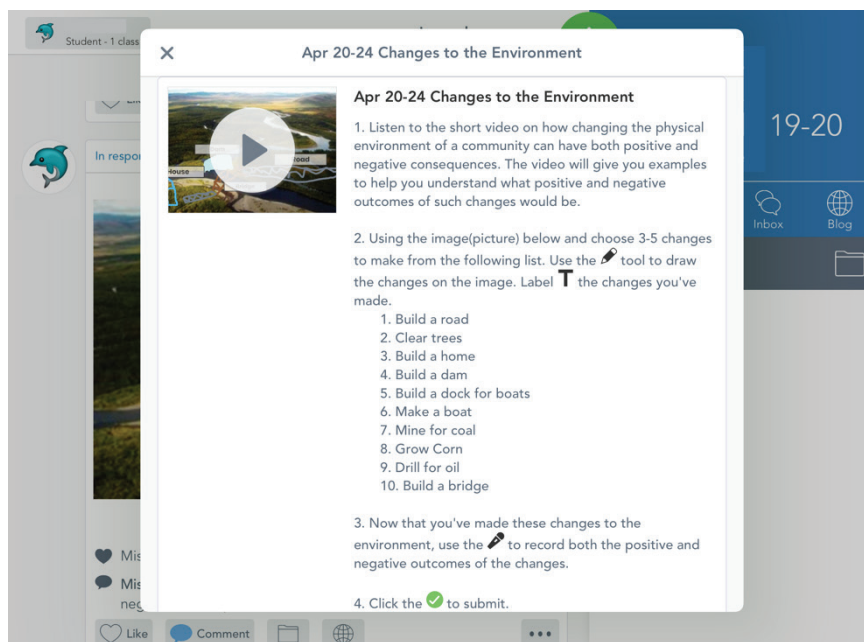
Figure 1. ORL in Seesaw (2nd Grade).

Figure 2. Sample Student Work with Teacher Feedback in Seesaw (2nd Grade).

Teachers provided feedback to students as work was submitted throughout the week (Ward-Jackson & Yu, 2019). For example, in a recent lesson, second graders watched a short video about measurement, created a meter tape, measured objects around their home, and submitted pictures of individual objects next to the meter tape. To view additional artifacts illustrative of ORL at ABC Elementary, go to: https://bit.ly/2AdGrAc.

RESULTS

Before transitioning to ORL teachers were skeptical and uncertain but quickly recognized the need to move outside their comfort zone in order to help their students learn. With adequate professional development and practice they have been satisfied with how the school is implementing ORL. After two weeks of ORL, the school sent a feedback survey to parents regarding their ORL experiences. Parents have appreciated the ability to have all schoolwork on one platform, especially with children in multiple grades. Parents explained that while they are still learning how to use Seesaw and facilitate their child's learning from home, the transition to ORL has been mostly smooth. However, some parents have struggled to facilitate ORL developed by their child's teacher. Many parents have experienced increased demands on their time, while others have become housing, food, and healthcare insecure. In response, ABC Elementary worked with community partners to provide families with resources, while also being flexible with student expectations.

IMPLICATIONS

Several practical implications have emerged from ABC Elementary's experience that can inform teacher professional development. First, we recommend that teacher professional development focus first on establishing instructional goals before considering the role technologies may have in teachers' lessons (Harris, 2016; Harris & Hofer, 2009). This approach results in a cohesive ORL learning experience for children rather than a piecemeal list of unrelated activities that take time, but do not necessarily result in mastery of outcomes. Teachers at ABC Elementary were encouraged to focus on essential content, which we believe was incredibly important as families have increased responsibilities and demands during the COVID-19 pandemic. We believe an early professional development task should be curriculum mapping where teachers identify key content topics and standards. In doing so, teachers can set instructional goals for the most

important content, ultimately allowing teachers to focus instructional design on meeting those goals. Once instructional goals are established, we recommend engaging teachers in dialogue regarding how those content goals can be achieved instructionally in an ORL environment. Teacher collaboration should focus on solving the authentic pedagogic problems teachers are facing (Koheler et al., 2011). Design thinking strategies, such as collaborative brainstorming, rapid prototyping, and capturing and integrating feedback (IDEO, 2012) likely would prove useful for teachers as they design, develop, and evaluate their ORL instruction.

At ABC Elementary, the school selected Seesaw as their ORL platform, but also allowed teachers to use other technologies to enable and facilitate student learning. We believe this was an effective approach, because it provided teachers, students, and parents with a common ORL experience through Seesaw, while also allowing teachers to use technologies and other resources that best aligned with their students' needs. We recommend that schools follow a similar approach, but also caution that although some teachers will be knowledgeable and comfortable making their own technology selections, others will inevitably require more support. During professional development, facilitators need to build the understanding that no single technology solution exists for every situation (Mishra & Koehler, 2006) and that even in ORL, not all experiences need to be digital. Yet in a transition to ORL, teachers may feel compelled to teach in fully digital ways that may be unfamiliar and overwhelming to them. Therefore, it is important professional development facilitators help teachers select both digital and non-digital technologies so that any gaps in teacher knowledge can be minimized and ultimately developed.

During professional development, time also should be spent on helping teachers learn effective online teaching practices. Most teachers, including those at ABC Elementary, have limited experiences teaching in an ORL environment (Schwirzke et al., 2018). Many teachers will likely rely on their own experiences as a student in an online course as they create their own ORL instruction, which is a common phenomenon (Britzman, 2003; Danielewicz, 2001; Lortie, 1975). In elementary contexts, these experiences teachers had as an online learner in college or high school likely are not appropriate. Therefore, facilitators need to assist teachers in developing new conceptualizations of what effective ORL looks like so that they have a model from which they can ground their own instruction, including the development of well-organized and consistent ORL environments that are varied and authentic where teachers and students can interact regularly both synchronously and asynchronously (Journell & Schouweller, 2019; Ward-Jackson & Yu, 2019). We also recommend an emphasis on strategies focused on (a) reducing student social isolation in ORL environments, (b) communicating teacher expectations, (c) fostering communication among students, and (d) how to formatively assess and support students' learning. Where possible, these strategies need to be modeled for teachers so that they can fully understand and utilize the strategy in their own instruction. In addition, we recommend teachers explore resources on ORL provided by organizations like the International Society for Technology in Education (https://www.iste.org/explore/learning-during-covid-19/10-strategies-online-learning-during-coronavirus-outbreak), the National Education Association (http://www.nea.org/home/30103.htm), and the National Association for the Education of Young Children (https://www.naeyc.org/resources/pubs/tyc/apr2020/play-child-development-and-relationships).

FUTURE RESEARCH

Prior to the pandemic, K12 ORL was not common in schools or an area of emphasis in teacher education (Larson & Archambault, 2019; Schwirzke et al., 2018), but is now and will likely continue until the pandemic subsides. Several areas of K12 ORL have previously been explored (e.g. Farmer & West, 2019; Journell & Schcouweller, 2019; Ward-Jackson & Yu, 2019), however many of these studies were based on limited empirical evidence from populations other than elementary age groups. Given the widespread implementation of ORL, it is important these and other issues are re-examined with all age groups, including: (a) how have teachers taken advantage of ORL benefits in their instruction, (b) how prepared are learners for ORL, (c) how can schools develop consistent structures through which ORL is carried out while also balancing individual student and teacher needs, (d) how are teacher education programs preparing new teachers for ORL environments, and (e) what has been the impact of ORL on student learning and teacher knowledge? Many researchers, including the authors of this chapter, are currently investigating these and other questions facing our profession, and as they do so, we recommend mixed-methods approaches so that holistic understandings of these issues can be developed. Given the novelty of these uncertain times and the extraordinary measures being taken by schools, having a more comprehensive understanding of what has happened, how it has happened, and the impact of those actions is important for charting a path forward that supports students, teachers, parents, and our broader communities.

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Using Teaching Menus and Portfolios to Support At-Home Interns' Work

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With the Covid-19 virus closing schools and all teaching moved on-line, our teacher preparation program faced the task of providing educational opportunities that replicate student teaching. While nothing can replace time with students, our elementary education program created a Teaching Intern Menu that gave interns several varied opportunities to grow in the field while learning more about online learning. Opportunities included work in teaching, research, and service, much like what faculty use when going up for tenure and promotion. Reflective interviews with teaching interns at the conclusion of the semester indicate the menu was helpful and gave interns new and varied skills that will benefit them as they begin teaching careers in a time ripe with change and opportunity.

Keywords: teaching menu, portfolio, reflection, choice, research, service, interviews

INTRODUCTION

Like many universities, our elementary education teacher preparation program wondered how to maneuver after Covid-19 cancelled schools and sent teaching interns online for the remainder of the semester. Interns worried they had not gained all they needed from their time student teaching. Faculty knew interns needed to continue to grow in order to be hirable and capable of running their own classrooms in the fall. We could not rely on the public schools to support the interns; they were attempting to move thousands of students online (ksde, 2020). We needed to come up with some options for interns who were now hours from campus, home-schooling kids, isolated away from children, dealing with limited access to wifi, in a rural district, or in a very urban one.

INNOVATION

Research has shown that portfolios can be effective in evaluating teaching interns. The Teaching Center (Washington University in St. Louis, 2020) identifies the primary purpose of portfolios is to document expertise in teaching, with power coming from the reflection on the articles in the portfolio. Zeichner and Wray (2000) note a credentialed portfolio as one that can be used for assessing a student teacher's effectiveness on teaching standards. This seemed to fit what we were looking for: a portfolio documenting their expertise, seeped in reflection, and then used as evidence students were fit for licensure. What resulted was The Intern Teaching Menu – a collection of options allowing interns to explore areas of teaching, research, and service. These are areas our institution values in faculty and students. We were cognizant of the personal lives of our 33 K-6 teaching interns; the menu had to have flexibility for interns facing numerous challenges at home. What followed were opportunities to expand knowledge of online learning through research, that allowed interns to practice with virtual teaching, and provided applications that could immediately impact students and families.

We wanted students to develop their own skillset in teaching online, utilizing the same platforms their mentor teachers were using, but not all mentor teachers were using synchronous learning. This helped shape the service and teaching columns of working with other children through Zoom and tutoring. Online teaching would require the creation of plans, so we added that as an activity in teaching. We noted that within several days of schools shutting down, dozens of websites were being promoted for e-learning, and not all were appropriate. This helped shape another activity – researching websites. Our Dean noted the need for students in our program to continue to promote education to incoming freshman, so that added another service opportunity. Through watching social media, listening to our students and mentor teachers, and waiting for guidance from the state, we were able to craft a menu of activities that benefitted our stay-at-home in-

terns while also helping interns create a portfolio to showcase what they'd learned in their time of "continuous learning," (ksde.org, 2020). We then set up Zoom interviews for interns to meet with faculty to showcase their portfolio of work and respond to questions about their growth over the semester, the challenges, and their next steps as educators.

Below is what was presented to the teaching interns.

THE INTERN TEACHING MENU – SPRING 2020

Teaching – work directly tied to your field placement	Research – evaluating strategies and programs	Service – work that benefits others in education and at WSU
Work with CT to plan and prepare materials and lessons for the remote learning of the students in your placement. (minimum 20+ hours, logged and verified by CT)	Locate and evaluate 4 free on-line learning programs for elementary students. Provide the objective of the learning program, who it is suited for, the research behind it, how data/assessments are utilized, how this benefits the learner (standards met), and why a teacher might suggest it to parents.	Provide free tutoring and learning support for an elementary student(s) in your community. (minimum 20+ hours, would need to logged and verified by child's guardian)
Design and develop teaching videos that address grade level standards for the students in your placement. Minimum of five, 5+ minute videos	Conduct a literature review that addresses the differences in at-home learning to the classroom environment. Minimum 5 pages, 3 references required	<u>Part 1 of 2</u> Participate in an on-line student panel to share your experiences with HS, pre-program and/or Core 1 students, and then write a summary of your experience and write an email to the attendees giving follow-up information AND (see below)
Design and develop two weeks of at-home schooling packets that address grade level standards for the students at your placement.		<u>Part 2 of 2</u> Develop a recruitment video for the profession that shares your "Why" for teaching and explains the WSU teacher-prep program. Would need to be 1:00 long, approved by a faculty member, and it WOULD be posted on the SOE facebook/twitter pages

Choose two from above, and they must come from two different columns, to earn a B, and a third for an A for your final eight weeks of student teaching. A journal of your time working with your CT would also count as a third activity. **It is expected that ALL interns will help their CTs as they can remotely. The above is in addition to that and supports that collaborative work.**

Additionally, every intern will be expected to complete an exit interview with a faculty member (via Zoom) that is professional and comprehensive. The intern will need to:

- *Explain how you've grown as an educator during the final 4-8 weeks of your internship; refer to your work from the Intern Menu*
- *Prove you're ready to join the profession, using examples from your work in the field and from the Intern Menu*
- *Explain how you'll address known weaknesses (challenges you were planning on addressing after Break) as a new teacher*
- *Final thoughts and your next steps*

RESULTS

Initial results indicate the interns found value in their work outside of the classroom, reflected on its value, and are more prepared for teaching, whether it's online or in the traditional classroom. Katie, a teaching intern in a large, urban district commented,

> For the most part, the choice board was straight forward, and I was able to begin the activities right away. The only option I found challenging was logging twenty hours of work with my mentor teacher. We decided I would get my hours by attending online professional development sessions and team meetings, communicating with parents, and creating weekly STEAM packets for the students. Because of this work, if I have to teach remotely in the future, I will be prepared to do so.

Deann, a teaching intern in a rural community, said,

> From the research portion of the assignment menu, I researched a number of sites that claim to be educational, I realize just how carefully I will need to evaluate educational sites for my classroom. This was a very beneficial assignment that will help me in the near future as I begin teaching or prepping for extended online teaching as a worst-case scenario.

Some menu options were more popular than others; all 33 interns chose to research four websites instead of writing a paper. Interns enjoyed making videos for future students but the quality was problematic; at last count fewer than five were usable in a marketing capacity.

IMPLICATIONS

We now recognize there was a disconnect between what we expected and what students delivered (Breault, 2004) in this initial attempt. There was a lack of consistency between students' assignments and in how faculty rated the assignments. The creation of rubrics to further clarify expectations for both faculty and interns would be beneficial (Contreras-Higuera, Martínez-Olmo, Rubio-Hurtado, & Vilà-Baños, 2015). Interns should provide some guidance on the development of these rubrics (Contreras-Higuera et al., 2015). Similarly, mentor teachers, who were overwhelmed with their own students' needs, should be consulted in developing future menus and rubrics.

We also found the interviews powerful - essential in understanding the choice and depth of the assignments. Breault (2004) notes explaining choices and reflecting upon them, especially with the mediation of a mentor, helps the mentee transition into thinking more like a teacher. The interview ultimately became more of a final learning activity, bridging the gap between the two distinct learning environments and evidence needed by both faculty and intern. Interns were open to sharing their work, which gave faculty the opportunity to ask the set questions and also guide reflection on their work, its usefulness moving forward, and the gaps in learning that remained unfilled. Nearly half of the interviews were conducted with two faculty members, while the remaining only had one faculty member. Responses from interns and faculty indicate the helpfulness of having two faculty members present, allowing for more give-and-take in conversations and more depth to responses.

FUTURE RESEARCH

Results indicate that having a menu of choices to better fit the varying needs of the interns is a good starting spot. The "Research" column needs more choices; the research on the websites was well-received, so perhaps that activity could be better delineated, with research on STEAM websites, or virtual field trips, or sites best suited to students with learning differences. A poll of future interns would provide some guidance in the development of this category. It would also be interesting to check in with these interns after their first few months of teaching and find out what they felt they were lacking as new teachers who missed the last portion of student teaching. Perhaps there are areas we can explore with interns through online work or pushed to a time when interns are in the field.

We believe that nothing can replace the time teaching interns spend in the field with qualified mentor teachers and students. However, in a season of mass change in all aspects of education, allowing teaching interns to choose the proj-

ects that best fit their lives and then letting them share their successes and challenges with a mentor faculty member proved helpful and rewarding for all involved. Our teaching interns are ready to enter the profession and we have evidence to support their work. As they continue to look for jobs, we can speak confidently of their work both in and out of the classroom during this time and their flexibility in adjusting to the ever-changing world of education.

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Developing Educational Websites in lieu of Clinical Fieldwork

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When the COVID-19 pandemic prematurely ended our field-based social studies methods course, we quickly pivoted to creating a public educational website about how pandemics have impacted society past and present. Though the website was a limited replacement for clinical classroom experiences, we found valuable learning through the process that aligned well to the course's enduring understandings. Crafting content for a social studies website required us to create accessible texts and organize information for an authentic audience around key questions within a topic responding to current events. We propose that other teaching methods courses could build on this example and make the development of educational websites a valuable extension of clinical fieldwork.

INTRODUCTION

The COVID-19 pandemic prematurely ended our secondary social methods courses four weeks early, and we were in need of a replacement for the fieldwork component of our class. Our teacher education program at Loyola University Chicago is field-based, meaning that all courses are conducted in schools or at other educational sites (Ryan, Ensminger, Heineke, Kennedy, Prasse, & Smetana, 2014). These clinical experiences are central to the preparation program, and candidates' coursework is, to a significant extent, designed around the work they are engaged in with teachers and students (Zeichner 2010). In short, the fieldwork is at the core and classwork supports the experiential learning.

When our university ended all in-person instruction with a month remaining in our course, we had to forgo 28 hours of fieldwork and classwork onsite at a local public high school. This was not only deeply disappointing, it brought into question how we could meet our courses' enduring understandings (Wiggins & McTighe 2005). As presented in the syllabus, these enduring understandings require candidates to create instructional materials specific to the classrooms in which they are working:

- Design a standards-based instructional unit that uses backward design to align objectives with assessments and instructional practices based on high expectations for each student's learning and behavior.
- Select relevant instructional content, materials, resources and strategies for differentiated and universally designed instruction.

Typically, candidates in the social studies methods course would demonstrate their attainment of these objectives through assessments embedded in their classroom work as well as assignments produced for the instructor. But with the classroom work no longer possible, the instructor, Dr. Tocci, proposed that he and the candidates collaboratively develop an educational website as a proxy experience.

There appears to be limited literature about employing website development as a strategy to build candidates' pedagogical skills. Burgess (2009) found that incorporating online tools into a reading pedagogy course, candidates in the

course would be better equipped to support student independent learning. Lindsey-North (2000), working with an earlier generation of web platforms such as bulletin boards, argued that websites had great potential in pre-service programs, but it fell short due to lack of candidate motivation. Still, other scholars have found that explicitly teaching technology integration as part of preparation programs is increasingly important for future teachers (Admiraal, van Vugt, Kranenburg, Koster, Smit, Weijers, & Lockhorst 2017; Buss, Foulger, Wetzel, & Lindsey 2018).

Indeed, building class websites has become a common practice for teachers to communicate with students and families, but as Dunn and Peet (2010) have argued, these sites can do more than present basic information. At their most developed, class websites can serve as "a dynamic and growing knowledge repository for the course" (Dunn, 2013, p.24). Our experience suggests that teacher candidates can have valuable learning experiences by developing educational websites that seek to be meaningful enhancements and extensions of the curriculum.

INNOVATION

As a group, our initial discussion focused on how to develop a website that would be useful to teachers and students at present. We had observed that teachers were struggling to rapidly move their curriculum online as school districts shifted to remote learning. Our experiences in schools suggested that many students and teachers would want to explore the history of epidemics and the current social disruptions stemming from the Coronavirus, but that few teachers would have the time and energy to collect and curate these materials in late-March of 2020. But as a class, we now did.

On the recommendation of one candidate, we selected Squarespace as our platform and secured the URL www. pandemics.education. We divided the work among the candidates and instructor to build out four major sections of the site: a brief overview three pandemics in the past; a discussion of the emergent impacts of the COVID-19 pandemic; a set of tools for distinguishing reliable from false or misleading information online; and a page of questions and resources to prompt students to consider the post-COVID world. These four sections are a clear reflection of the social studies education philosophies embedded in the course, namely that students should develop "historical thinking" (Wineburg, 2001) and "online reasoning" skills (Wineburg, McGew, Brekaston, & Ortega, 2016) in social studies class in order to understand the present and take informed action for a better future (Swan, 2013).

Over the course of two weeks, candidate teams developed content for each section of the site and provided feedback as well as resources to one another. The instructor guided development to align with the course enduring understandings, particularly maintaining high expectations for students who access the site while also making its content readily accessible and meaningful to a diverse range of learners. We attempted to do this in three ways. First, we used the students at the Chicago public high school where our course had been based as a reference point. The students here, on average, score significantly below state median on the SAT, and have 25% of the student body enrolled in special education and 18% enrolled in the English as a second language program. This challenged us to ensure our site could be read independently by struggling readers without sacrificing the sophistication of the content. We also drew on our knowledge of inquiry-based history teaching practices (vanSledright 2010), which meant integrating a number of compelling questions into site content as well as recommendations about ways students could publicly share their own views and experiences. Finally, we used the Universal Design for Learning framework (Novak & Rose, 2016). This is a set of principles for planning and delivering instruction that increases accessibility for students by emphasizing multiple means of representation, engagement, and expression throughout lessons. This pushed us to consider how we could use multiple media and a variety of page layouts to facilitate student connections between text, images, videos, and charts.

With a full version of the site developed over three weeks, we published and shared the website broadly through our professional networks in early-April. Over the first month, the site had more than 1,600 unique visitors, largely from the United States. Anecdotally, we have heard that seven high schools in our region have used the site or shared it directly with students. We are currently working with a literacy education class at St. Edwards University to develop a new section of the site that links to and provides annotations about child-appropriate literature and websites addressing COVID-19.

RESULTS

The results of our website project should be understood as a developed-on-the-fly attempt to approximate the clinical fieldwork experiences we missed due to the pandemic. It was our collective goal to continue to build candidates' practical

skills and content methods pedagogy by creating a site that would have an authentic audience of teachers and students. To begin assessing if we met this goal, the instructor surveyed the candidates after the end of the course. Their responses comprise the remainder of this section.

Designing a wide-use website challenged us to really consider accessibility on a larger scale. We did not know the exact members of our audience, so we had to assume that everyone using the website has the potential to be a diverse learner and design accordingly. This emphasis on a varied audience has important implications for our in-person instruction as well as any online instruction we engage with in the future (Dack & Triplett, 2020; Tomlinson, 2017).

In building the website, we approached an issue we have been tackling throughout our semester: how do we balance important content and skills while simultaneously addressing issues and topics that are culturally relevant to our students (Kumar, Zusho, & Bondie, 2018)? Through practice in classrooms, we found that students were engaged most with content that was most relatable to them. In social studies, we are able to connect with various issues in social justice (for many of our lessons, racial and gender disparities) that are relevant to students in high school and later adult life. On the website, we were able to take a tangible issue facing high school students as well as ourselves - being out of school due to a global pandemic - and use our experience in the classroom to create meaningful pages to teach both content (relevant data and information about COVID-19) and skills (practical ways to identify reliable sources as well as ways for young people to become leaders in their community) (Swalwell & Schweber, 2016).

Though the idea for the assignment was created rather quickly in response to COVID-19, the assignment was very relevant for the current times and that made the work feel more important. Something we liked about it is having the students create what the assignment is. Through many Zoom meetings, we all decided what we wanted our assignment to be. We not only created the content in the assignment, but we also created the assignment itself. We think it is useful for students to be very active in choosing what type of assignment they want to do (Hanewicz, Platt, & Arendt, 2017).

Teachers must create a lesson that fits the circumstance, even if it is unexpected. A teacher can have the same enduring understandings and essential questions and totally change the platform it is presented on. Something we learned while building the website is just how universal essential questions and guiding questions are to teaching social studies. Incorporating questions in our website structured it in such a way that inquiry and critical thinking were at the forefront of the experience. It reaffirmed the importance and of using questions to guide learning (Sattes & Walsh, 2014) and showed us just how ubiquitous they are in social studies education (Lennon, 2017).

IMPLICATIONS

Collectively, we believe that other teacher candidates and possibly in-service educators should have the opportunity to work on website development since it both helps build valuable pedagogical skills, such as designing for diverse learners, and can enhance the curriculum. Based on our experiences, articulating a clear purpose with an authentic audience was vital to our work. Candidates were not creating another unit plan for the instructor to critique but were collaborating on a public resource set that we expected many teachers and students would access. This gave real stakes to our efforts; the site had to be high quality because teachers, some we knew but many we did not, would be assessing our work for value to their own students and curricula.

Because we were trying to complete the website before the end of the semester, we skipped a number of steps that should be part of future website projects. First, we did not thoroughly search for websites addressing similar content or that attempted to serve a similar purpose. We would have learned a great deal and improved our own work if we had. Second, we did not seek feedback from teachers or the public until after the site was launched. We have since received comments, which we have used to make revisions including the addition of several graphs, more historical images, and a subsection on the politics of naming pandemics. Third, we needed to explore more ways to embed inquiry-based teaching techniques into the website. The website presents a large amount of information with numerous questions poised to students interspersed, but there are only a few places where students are asked to submit their ideas or to share them via social media. Future sites should be more interactive and solicit students' ideas, questions, and insights in order to catalyze learning (Fiock, 2020).

We believe other teacher education programs should incorporate public educational website development into their programs as a way to extend clinical learning experiences. It's quite possible that many do, and we encourage them to publish their experiences so the field can learn from it and collaboratively develop this practice.

FUTURE RESEARCH

Future research on educational websites needs to fall along two lines, which are both oriented towards building foundational theories and concepts for the topic. First, there needs to be investigation into how teacher-developed websites enhance and extend the curriculum. This entails exploring successful case studies as well as bringing together literature and new research into student perspectives on what makes for curriculum-enhancing sites. Following from that, we should investigate what teacher candidates learn from attempting to build these kinds of sites during their preparation programs. Our experience suggests that developing educational websites can provide additional valuable learning for candidates, both about building educational websites as a pedagogical tool and designing instructional materials for diverse student audiences.

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Supporting Children's Mathematical Understanding through a Hyperlinked Book of Mathematics Games

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To support teachers in rural areas, we created a hyperlinked resource book of games and activities for teachers to share with parents so they can help their children with mathematics while they are home. The book contains 13 games for elementary-aged students, along with hyperlinks to videos of the games being played and audio and visual literature resources that accompany the games. The customizability of the included games and activities promotes students' autonomy, allowing them to select a mathematical focus and thereby encouraging student-directed goal setting. The book was delivered in print to schools throughout a remote geographic region and via distance technologies to ensure student access. When delivering the books, a mathematics specialist met with administrators and teachers to provide support to them to understand the rules, guidelines, and mathematical value of various games.

Keywords: mathematics, activities, parents, resources, home, games, access, rural, equity

INTRODUCTION

Based on work from the National Research Council, supporting students' conceptual understanding is key to mathematical learning (Kilpatrick, Swafford, & Findell, 2001). A recent editorial from a well-respected mathematics education research journal (Williams & Leatham, 2017) recognized the importance of mathematics learning that can happen through games (Cai et al., 2020). Jackson (2011) and Nemirovsky, Kelton, and Civil (2017) illuminate the value of informal mathematics to support students' conceptual understanding. Mathematics games are one method of bolstering students' mathematical understanding. However, teachers and parents do not always have access to games or know which games to play to support children's mathematical growth. To fill this gap, we created a mathematics activity book and supplementary videos that illustrate connections between games and mathematical concepts. Our intent was to provide professional learning for teachers, who could, in turn, provide guidance to parents and students schooling at home. The book was designed to help teachers, and parents who were suddenly thrust into the role of teacher, engage students in learning mathematics in ways that would encourage the growth of students' conceptual understanding during these challenging times.

To support students' mathematical understanding, we created a book of mathematical games titled, *Mathematics at Home: Activity Book* (see Figure 1).

Figure 1. *Front Cover of Mathematics at Home: Activity Book.*

The book content and delivery methods were designed to ensure access for students. The games, in conjunction with the accompanying materials, address several recommended criteria from the Universal Design for Learning Guidelines (CAST, 2011). Offering both written and video instructions for game play provides students with an opportunity to control the transfer of information. The customizability of the included games and activities promotes students' autonomy, allowing them to select a mathematical focus and thereby encouraging student-directed goal setting. Many of the games require the recognition of patterns and the use of mathematical relationships, also part of the guidelines. Furthermore, playing games helps to encourage community building and student-parent communication, or communication between any two players. As students continue to play games, they are able to self-assess their strategies and learn perseverance. The "Connecting the Games to Mathematics" (p. 4) section of the book provides information on how to mathematize the games by asking probing questions (see Figure 2). Suggestions for engaging students before, during, and after the games are included.

Connecting the Games to Mathematics

The games included in this book provide children an opportunity to think about, and engage in, mathematics. As children play these games, they learn important lessons about perseverance, increase their ability to communicate mathematically, and practice their calculation and spatial skills. Playing games should be fun, but this is also an opportunity to build understanding of key concepts. Sometimes children need help to see patterns that will make the game easier. Here are some ways to encourage children to connect these games and activities to the intended mathematical concepts.

Before Playing

Prior to beginning a game, have your child read the directions, or read the directions with your child. Some of the games and activities have accompanying video demonstration links. After reading the instructions, ask your child questions like, "What do you think would be a good strategy for this game?" or "How are you going to add numbers during the game?" These kinds of questions will stimulate thinking about mathematical skills and relationships. Questions like these also demonstrate to children that they can ask themselves similar questions when they approach future games or activities.

While Playing

Many of the games and activities require children to make calculations during the game. It is okay for them to use paper and pencil for these calculations but encourage children to use mental mathematics when they can. Strategies like breaking up numbers to add and subtract can be useful and lead to greater fluency. To solve a problem like 26 + 28, children may think about breaking 26 into 24 + 2. Using this strategy, a child can add 28 and 2 to make 30 and then add 24 more to make 54 without using paper and pencil. These strategies are just as useful for calculations like 8 + 6 or 3/4 + 1/2.

Although many adults do not regularly discuss their strategies while playing a game, encourage children to talk about the decisions they are making. This will help you better understand their thinking. It may be useful, at least initially, to discuss your strategies out loud in order to help children think about the mathematics of the game. During your turn you can say something like, "I have to subtract 15 from 42. I am going to first take away 2 to get to 40. Then I am going to take away 10 to get to 30. And finally, I am going to take away 3 more to get to 27." This clarifies how you solved the problem and will encourage your child to use similar strategies.

After the Game

When you are finished playing the game, debrief with your child. Ask about the strategies that worked well and those that did not. Try to have your child communicate about parts of the game that were challenging for him or her. Develop ways for your child to address those challenges in the next game. You may find that the game was not at the right level for your child. If the game is too difficult, change game rules to meet your child's needs. The same is true if the game is too easy. Talking about the game at the end helps everyone feel better about the next time you play.

These suggestions do not need to be followed every time your child plays one of the games or does an activity. Asking these kinds of questions the first time you play the game, and periodically thereafter, promotes thinking about mathematics. Eventually children will begin to think about these questions themselves.

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Figure 2. Activity Book Page for Parents; Connecting Games to Mathematics.

The book was printed and hand-delivered by a mathematics specialist to teachers in rural schools and a digital version was made available to all teachers throughout one western state. When delivering the books, the mathematics specialist met with administrators and teachers to provide support to them to understand the rules, guidelines, and mathematical value of various games. We intentionally delivered printed books to teachers in rural areas where students may lack internet access, so that students would be able work on mathematics concepts regardless of internet connectivity or distance to population centers. Thus, although we emphasize the technological features of the book in this article, we wanted to ensure all students in our region of the state had access to the materials for learning. *Mathematics at Home: Activity Book*, hyperlinked here https://tinyurl.com/y8ra74qb, is unique in that it not only describes the various games, but includes video hyperlinks to help teachers and students understand and play the games. Additionally, the materials required for the games are items that students may commonly have around the house (e.g. dice, playing cards). We provided teachers with class sets of manipulatives to distribute with the books and school lunches to students who may lack access to such materials in their homes. We also included games in the book that could be played with natural objects (i.e. rocks) to increase access. The following provides two examples of games and accompanying videos.

Example One: "Bean Thirteen"

One game is based on a popular literature book, *Bean Thirteen* (McElligott, 2007). The purpose of the game is to find a pattern and use strategy to avoid removing the final bean from a central pile (see Figure 3).

Bean 13

The book *Bean Thirteen* by Matthew McElligott is a delightful story about Frank and Flora, two bugs who were picking beans for dinner. As Flora picks the last bean, Frank become desperate to figure out how to avoid the bad luck that comes with the 13th bean.

Use this link to hear the author read this story:
https://www.matthewmcelligott.com/newwebsite/resources-for-teachers/

Dr. Abe explains the rules in this video: http://www.idahomath.com/resources/bean-13-game/ .

What you will need for this game:

•13 items that can represent your beans

Directions:

Two players place their 13 "beans" in a pile in the middle of the game area.

Players take turns removing the beans from the center pile. On each turn a player can take either one or two beans.

To win this game, a player **MUST NOT** take the last "bean" from the pile; the player who takes the last bean (Bean 13) loses the game.

Player 1   Bean Pile   Player 2
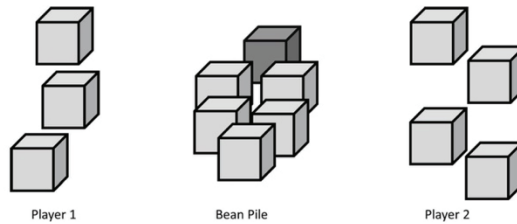
Think Mathematically

As children play this game they should look for patterns and think about their strategies. Players who can uncover the underlying mathematics of this game will improve their chance at success.

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Figure 3. Activity Book Page for the Game Bean Thirteen.

After repeated rounds of this game, students will notice the mathematical structure and use their knowledge of multiples to develop more efficient strategies. Teachers can capitalize on what they notice about students' thinking to promote deeper understanding. We created our own video, linked in the book, to explain how to play the game and included a link to video of *Bean Thirteen* author, Matthew McElligott, reading his book.

Example Two: "Even and Odd Connect Four"

The goal of "Even and Odd Connect Four" is to fill a game board and connect four spaces in a row (see Figure 4).

Figure 4. Activity Book Page and Game Board for "Even and Odd Connect Four"

The game board is divided into even and odd spaces. Students roll dice to find either sums or products and determine whether the answer is even or odd. They place objects on corresponding spaces. Through playing various versions of this game, students develop a structural understanding of addition and multiplication rules. Teachers can use these experiences to proceduralize this information in the classroom or an online setting. We created a video explaining different ways to play this game and developed an online format ("Math Home Games," 2020), for game play.

RESULTS

Given the current COVID-19 situation, teachers were looking for resources they could share with students and parents that would promote student engagement with mathematical concepts at home. In other words, something other than worksheets. *Mathematics at Home: Activity Book* was well received from teachers. One school district mathematics coach received the book and replied (unsolicited) via email, "Oh my gosh, this is amazing. I am so excited to share this out with all the teachers!!! Thank you so much. Yes, truly a gift!!!! :-) Bless you all." Another teacher responded, "LOVE THIS!!!!! Thank you so much!" A superintendent wrote, "[The book] sparked a focus on the subject matter and discussion about how we [teaching staff] might use these same activities and principles in the classroom starting in the fall." Based on the superintendent's feedback, we consider the book a resource that can spur discussion about ways to reach students through non-traditional avenues, such as the math games. Although use of the book and data on the number of times the videos have been watched are emerging, we are confident that teachers have found the resource helpful to support their students' conceptual understanding in mathematics.

IMPLICATIONS

The digital book supports teachers throughout our state and beyond and serves as a resource of informal learning (i.e. Jackson, 2011; Nemirovsky et al., 2017) that has the potential to be powerful for students' mathematical growth. We intend for the book to be a catalyst for teachers to use as a resource to design their own informal learning experiences for students. One intention is that teachers will take the games and activities from the book and create additional resources

that are specific to their students' particular grade-level needs. For instance, after reading Example One in this paper, about the book *Bean Thirteen*, teachers may consider other literature books with strong mathematics connections for which they could create associated games for their students, based on specific grade level and needs. Teachers are also encouraged to consider modifications that would make the provided games more appropriate for their students' learning needs. Having the resource as a guide and the accompanying videos provides practicing teachers with an initial resource they can use as a launchpad for creating other supports for their students. Because games offer an engaging experience with immediate feedback for students, they also provide an unobtrusive tool for practicing and prospective teachers wishing to study student thinking (Kamii and Joseph, 2004).

We also encourage professional development providers to support teachers to learn to incorporate games and activities into their online learning offerings. We have worked with district mathematics coaches to support teachers to use our book and we encourage coaches to work with teachers to create their own online learning activities for their students. Using our online version of the game "Even and Odd Connect Four" (Example Two), we were able to teach instructional coaches many of the design features in Desmos (n.d.), an open-source, online graphing calculator, such as how to create a random number generator used in dice games. We believe coaches can work with teachers in their districts to design new activities. The intent is that the book will spur opportunities for creative thinking for coaches and teachers who can then support students' mathematical understanding.

FUTURE RESEARCH

The intent of writing and publishing the *Mathematics at Home: Activity Book* was to provide a resource that would support teachers as they help parents encourage mathematical learning for their children. At the writing of this chapter, the book has been published for three weeks, resulting only in anecdotal data about the reception, use, and learning outcomes from actually playing the games or completing the activities. We plan to research the frequency of use of the book in general, as well as the use of particular games. Eventually, we plan to interview stakeholders who interacted with the books (i.e. teachers, parents, students) about the benefits of the resource, student learning, and possible areas for improvement. We are also collecting email feedback and questions from those using the book to consider refinement of the book in the future.

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Designing Personalised, Authentic and Collaborative Learning with Mobile Devices: Confronting the Challenges of Remote Teaching During a Pandemic

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This article offers teachers a digital pedagogical framework, research-inspired and underpinned by socio-cultural theory, to guide the design of personalised, authentic and collaborative learning scenarios for students using mobile devices in remote learning settings during this pandemic. It provides a series of freely available online resources underpinned by our framework, including a mobile learning toolkit, a professional learning app, and robust, validated surveys for evaluating tasks. Finally, it presents a set of evidence-based principles for effective innovative teaching with mobile devices.

INTRODUCTION

The current pandemic has been responsible for the loss of many opportunities. However, it has provided an unprecedented chance for students and teachers to embrace new opportunities for effective digital learning. Prior to the pandemic, the use of mobile devices (m-devices) was often demonised and banned in educational settings (Burden, Schuck, & Kearney, 2019). Now mobiles are the very devices that will provide access for many to learning that is only available online.

This article explains how m-devices such as smartphones, tablets and laptops may be used in remote or online educational settings to support effective, innovative technology-mediated learning. We use the term mobile learning (m-learning) to describe students' learning supported by their use of m-devices. We introduce a set of rigorous innovations, developed to support teachers' design of m-learning activities. These resources are underpinned by our socio-cultural framework, the iPAC Framework (Kearney, Schuck, Burden, & Aubusson, 2012), that articulates three key dimensions of m-learning: Personalisation, Authenticity and Collaboration (or 'PAC'). These dimensions each have two sub-dimensions (see Figure 1).
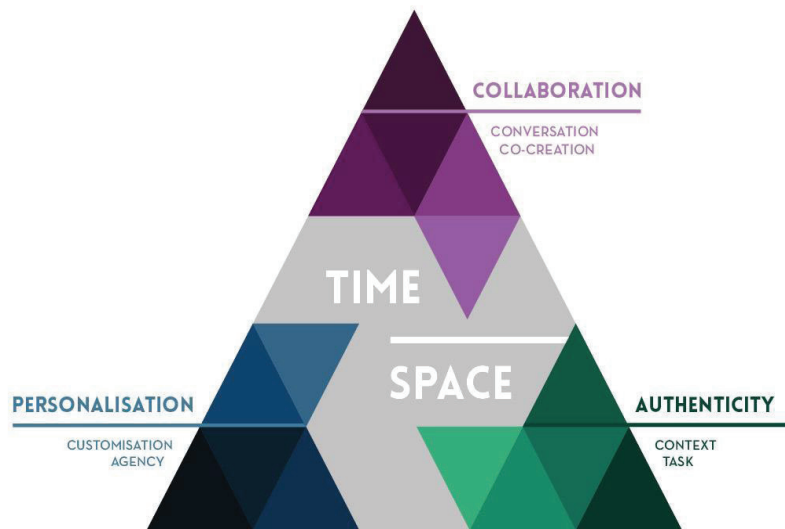
Figure 1. A mobile pedagogical framework: The iPAC Framework (reproduced with permission from Kearney, Burke, & Schuck, 2019, p.754).

The collaboration dimension (conversation and co-creation sub-dimensions) emphasises the technology-mediated opportunities for peer conversations and learners' co-creation and sharing of content. The personalisation sub-dimensions, agency and customisation, highlight learners' autonomy and potential ownership of the learning process, and the use of apps to individualise the learning experience, for example, using context-aware apps. The authenticity dimension (context and task) points to learners' use of m-devices to create personally meaningful experiences, highlighting potential immersion in real-life, in-situ learning opportunities, and the mimicking of relevant, discipline-specific tasks and processes. At the core of the Framework is the 'time-space' domain, highlighting the malleable, multi-contextual nature of m-learning. Students may learn at unpredictable times and schedules, and across learner-generated spaces (Schuck, Kearney, & Burden, 2017), particularly during the current pandemic .

INNOVATION

To assist the professional development of teachers and teacher educators wishing to create engaging m-learning experiences for students who are off-campus during this pandemic, we offer a set of rigorous resources underpinned by our iPAC Framework. These resources assist teachers seeking to modify their online practices from content-driven, presentational approaches, to ones that emphasise personalisation, authenticity and collaboration.

Firstly, an m-learning toolkit (Burden & Kearney, 2018) was developed during an EU-funded project, Mobilising and Transforming Teacher Educators' Pedagogies (see http://www.mobilelearningtoolkit.com). It consists of interactive video cases and exemplar eBooks illustrating the use of m-devices in education, and a rubric for evaluating the value of apps in different contexts. Secondly, a professional learning app for educators was created in another EU-funded project: Designing and Evaluating Innovative Mobile Pedagogies (DEIMP). The app (see http://www.deimpeu.com/app-io2.html) supports educators to design and evaluate innovative m-learning episodes. A third resource is a set of pedagogical principles underpinning innovative m-learning practice (http://www.deimpeu.com/principles-of-innovative-mobile-learning.html). These evidence-based principles emerged from a meta-study of teachers' mobile practices (Burden, Kearney, Schuck, & Hall, 2019). Although developed independently from our Framework, they aligned well with the iPAC dimensions (Kearney, Burden, & Schuck, 2020) and guide teachers' m-learning practices. The final resource is a set of validat-

ed surveys for educators to evaluate their own m-learning activities (Kearney et al., 2019). These instruments are available via the iPAC website (https://www.ipacmobilepedagogy.com) and were extensively developed during an Australian project: Optimising Teaching and Learning with Mobile-Intensive Pedagogies. There are teacher and student versions to enable multiple perspectives, and a new survey for teachers of students with disabilities will soon be available.

RESULTS

Our resources have been tested extensively by teachers and teacher educators across four continents and their impact on users was instrumental in a recent international e-Learning award. Evidence collected for this award and other impact assessments, indicate how the resources have encouraged users across several countries to reassess their preconceptions about the use of m-devices for teaching. In terms of the current crisis, this is significant because it reveals how the resources have inspired teachers to view m-devices as tools to enable their students to make greater choices and take more responsibility for their own learning. Reports from users reveal how they have appropriated m-devices to enable students to learn beyond formal school boundaries (spatial and temporal), a necessity in the current pandemic. One small example would be the work of teachers in Colombia who are using the iPAC Framework to model good practice for their students who often have limited access to technology. Using online authoring tools to collaborate remotely in the construction of e-Books, the work of these teachers and others like them, illustrate how the resources could be used to support more creative and collaborative learning experiences for students.

IMPLICATIONS

Our resources will guide teachers' design of digital learning activities during this pandemic. They can support educators' consideration of the 'signature mobile pedagogies' of personalisation, authenticity and collaboration, and of how they can be exploited in a range of more flexible 'time-space' arrangements, including less-scheduled timetables and a range of physical and virtual spaces in which students are learning during the crisis. For example, one of the challenges of moving learning off-campus is finding new ways to promote collaborative group work, interactions with peers and teachers, and opportunities for students to share and co-create. Use of m-devices can alleviate isolation and solitary learning, and promote learning conversations with peers and experts well beyond the class, and possibly across geographical borders. Students' m-learning can potentially make activities more creative and participative, for example, co-writing and performing a virtual music ensemble, or collaboratively solving a real-life science problem.

We offer video vignettes in both our m-learning toolkit and professional learning app to provide guidance. For example, vignettes in the Collaboration section of the matrix in our m-learning toolkit: http://www.mobilelearningtoolkit.com/video.html. The right column of this matrix includes illustrative examples for teacher education contexts. One video (https://bit.ly/teacherPLN) explores the rich collaborative m-learning opportunities available through pre-service teachers' professional learning network activities (Kearney & Maher, 2019). Additional cases are available on the DEIMP website (https://innovedu.com/deimp_new/recommended_videos.html), illustrating our principles for innovative m-learning (Burden et al., 2019). Some cases depict tasks enacted in school campus settings but could easily be re-designed for remote settings during the pandemic. For example, this elementary school challenge task (https://bit.ly/dronetask) illustrates co-design and authentic learning principles. It could be used as a stimulus for teachers to create a re-designed task for home (or backyard) settings, adopting video-conferencing tools for peer conversations and cloud-based platforms to facilitate exchange of ideas, peer consensus and negotiation of solutions.

Teachers can take advantage of both the teacher and student versions of our validated survey tools to evaluate their use of iPAC pedagogies in remote task designs. Teachers receive an automatically generated report upon submission of their responses, showing how specific approaches have been adopted (see Figure 2). The report includes links to pertinent professional learning resources. If the student version of the survey is completed, a supplementary chart is generated allowing teachers to compare their report with students' perceptions.
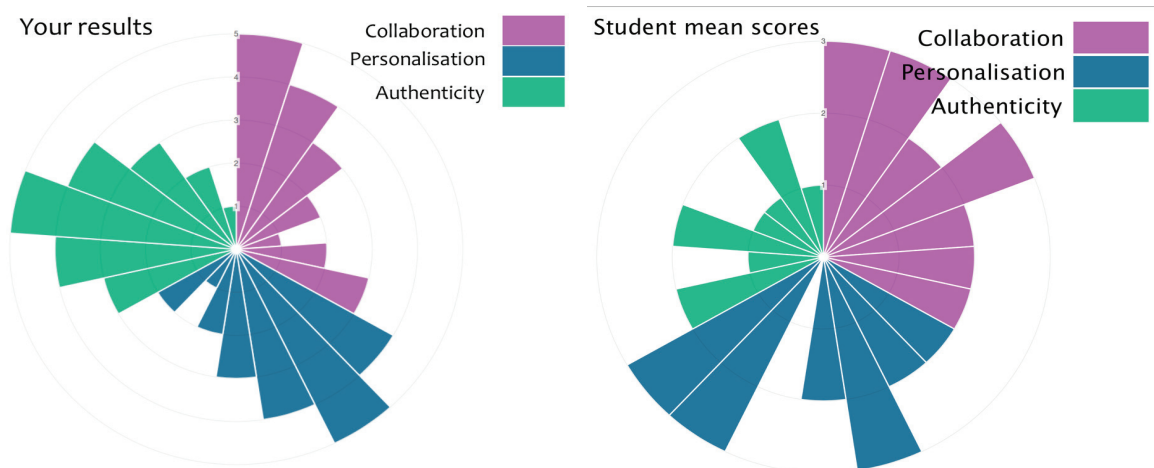
Figure 2. Visual polar charts of teacher and student results are generated in reports from the iPAC survey instruments. [Reproduced with permission from Burden & Kearney, 2018, p.93].

FUTURE RESEARCH

Despite the rhetoric around learner-generated contexts in the professional m-learning commentary, there has been minimal consideration of less formal, learner-controlled settings in teachers' m-learning task designs (Kearney, Burden & Rai, 2015; Kearney et al., 2020). This is unsurprising, given the generally scheduled nature of school timetables and conventional formal classroom settings that dominate teachers' and students' school environments. However, the current remote teaching situation is an opportunity to re-consider digital pedagogies in the home and other out-of-school learning environments.

Early reports indicate the default position for busy teachers transitioning to m-learning task designs during the pandemic is to emphasise content-driven, presentational teaching approaches (e.g., Karp & McGowan, 2020), typically involving use of video-conferencing (e.g., Basilaia & Kvavadze, 2020; Zhou, Wu, Zhou, & Li, 2020). These more didactic approaches are understandable given the minimal preparation time that teachers were given before moving to a remote teaching situation.

An urgent research direction is therefore to capture the range of exemplary m-learning practices adopted during and after the current pandemic, and to identify a wider range of pedagogies, using the iPAC framework as a lens to analyse data. We recommend use of our validated surveys to interrogate this phenomenon. Data will highlight innovative m-learning practices, including task descriptions and apps that are aligned with more generative, authentic approaches. In teacher education contexts, multiple use of the survey over a period of time will capture how pre-service teachers are developing their mobile digital pedagogies. Findings will be showcased on the iPAC website.

In summary, this paper presents a variety of robust resources to assist teachers and teacher educators during this challenging period. These resources are underpinned by the iPAC Framework, a research-inspired, digital pedagogical framework that emphasises a socio-cultural perspective of learning (Kearney et al., 2012). They should be useful in this time of remote learning where m-devices are likely to be the educational technology of choice for many students.

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Using Google Apps as a Tool to Advance Student Learning via Productive Small Group Discussions and Teacher Feedback in an Online Environment

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Two central tenets of seated mathematics education content courses at Missouri State University are 1) productive small group discussions guided by student thinking and, 2) teacher feedback focused on improving the quality of pre-service mathematics teachers' verbal and written responses. The current challenge is how to create those same experiences in an online environment, without significantly increasing the workload demands for teachers or students. The purpose of this article is to share an instructional strategy using Google Apps that was implemented to address this challenge. Preliminary results suggest that the strategy was effective in promoting student-to-student discourse, providing meaningful "in the moment" teacher feedback, and improving the quality of student responses to open-ended questions.

INTRODUCTION

In the midst of a sudden transition to an online learning environment, the challenge was to replicate features of seated mathematics education courses that best supported student learning. Central to course design was a vision that students would continue to see themselves as part of a community of learners in which their collective role was to support each other the development of a deep understanding of mathematics content (Garrison, Anderson & Archer, 2000). Also, the role of the teacher would remain the same. That is, to facilitate learning by: 1) posing questions that require students to generate a verbal/written response, 2) listening carefully to the language and meanings students use to communicate their understanding of the mathematical ideas, 3) crafting questions to assess and advance student thinking that could be further explored in small group discussions, and 4) providing meaningful feedback to move the collective groups' thinking forward (Boling et al., 2012). The goals of this paper are to share the key elements of the innovative strategy and describe what was learned from implementing the strategy.

INNOVATION

The setting in which this strategy was implemented was a statistics and probability course for pre-service middle and secondary mathematics teachers (n = 16). Google Apps was used in four different ways: 1) gathering information on the nature of students' current understanding of the course content; 2) analyzing those results for misunderstandings or cases in which the precision of language and meaning was lacking; 3) creating a learning experience that challenged students to communicate with each other in small group settings developing a product that conveyed an advancement of their current understandings; 4) providing a means for the teacher to give "in the moment" feedback to support students work in the small group settings. Explaining the technological intricacies of each aspect of the use of Google Apps would be quite lengthy. A video showing an overview of the ways Google Apps was used, as well as how to set up each of these uses, is shown here: https://youtu.be/XyAtO4fpf54.

Gathering Information

A Google Form, consisting of multiple choice and open-ended questions, was created to gather information on the nature of students' current understandings. A link was placed into the learning management system enabling students to answer the questions as part of their out-of-class work. An example of one of the Google Forms is shared here: https://tinyurl.com/FastFoodTemp.

Analyzing Results

Once students completed the Google Form, the teacher would review student responses using different aspects of the response feature of Google Forms. This feature allows for a review of individual student responses, a summary of the class' responses, and/or a spreadsheet that summarizes all student responses (https://tinyurl.com/FastFoodStat). Using these different features, the teacher analyzed students' responses for instances in which there was a lack of consensus to multiple-choice questions, or there was a clear misunderstanding or imprecise language was used on the open-ended questions. For example, the summary of class' responses to multiple-choice questions generates a pie chart providing the percentage of students responding to each choice (see fig. 1).
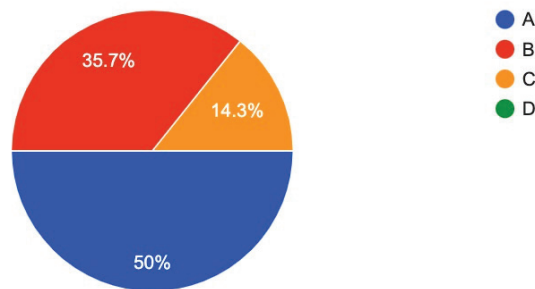
Figure 1. Pie Chart Output of M/C Question Responses.

Small Group Experience

After responses for discussion in small groups were identified, a Google Slide deck was created incorporating student responses and guiding questions (e.g., Evaluate each students' thinking. Provide feedback that would support growth in their understanding.) An example of a Google Slide deck is shown here: https://tinyurl.com/STAT343. After the initial template was created, the slide deck was copied a number of times corresponding with the number of breakout rooms that were to be utilized in the online class.

Feedback

At the beginning of the synchronous class, students were assigned to breakout rooms and prompted to access the Google Slide deck corresponding with their breakout room number. At this point, the teacher opened the Google Slide deck for each group in a separate tab on their browser which enabled the teacher to easily navigate each group's written work. If the teacher identified a gap in reasoning, they had the option to either enter the breakout room to engage the group in further discussion or add comments to the slide deck for the group to address. An example of the finished product of one group's completed slide deck, with teacher comments, is shared, https://tinyurl.com/STAT343Res.

RESULTS

A three question open-ended survey was given at the end of class to understand students' perception of features of the strategy that best supported their learning, https://tinyurl.com/GoogAppEval. Feedback from students was overwhelmingly positive. Specific features of the strategy that were mentioned by multiple students were: 1) teacher used the comment feature of Google Slides to provide "real-time" feedback, 2) students were given the opportunity to reflect upon and improve upon their own, as well as their peers' responses, 3) students were given the opportunity to collaborate with their peers, 4) there was a written record of students' thinking and teacher's feedback that could be referred to at a later time. Overall, students appreciated the collaborative nature of the experience. The response of one student seemed to best summarize the learning experience:

> "I really liked breaking off into groups and doing the Google Slides. I think it really made us think about the questions and my group had really good conversations. I think the most helpful thing was the teacher going back through all of our slides and adding questions to each slide. I liked how we all had our individual feedback and were able to think even more about the questions."

IMPLICATIONS

This study makes several contributions as to how to effectively use technology in an online setting as a tool to support meaningful classroom discourse and teacher feedback in order to advance student learning. First, although providing opportunities for students to reflect on their current understandings is a critical mechanism for learning (Brown, Roediger, McDaniel, 2014), finding ways to effectively and efficiently create these experiences in an online setting, without making students uncomfortable, is challenging. Using the response feature of Google Forms, the teacher can quickly scan student responses for instances in which there seemed to be gaps in student understanding. Then, using Google Slides, the teacher can create an experience that drives a focused small group discussion to address those gaps. There are a couple important considerations for the teacher when creating the Google Slide deck. First, in responding to multiple-choice items, it is important that groups' are required to provide a justification for their choice. Otherwise, there is no record of what led to the advancement in the groups' thinking. Second, in evaluating free-response items it is important to provide students with a range in quality of responses (i.e., exemplary, missing a key element, use of incorrect or imprecise language, or incorrect interpretation). Providing a range in responses allows for groups' conversations to involve discerning similarities and differences of responses which is another critical mechanism for learning (Schwartz, Tsang, & Blair, 2016). A question typically asked to support these efforts is, "Evaluate each students' thinking. Provide feedback that would support growth in their understanding."

Second, giving students the opportunity to interact as a community of learners is an integral part of a successful online learning experience (Boling et al., 2012; Bower, 2016; Hrastinski, 2009; Park & Bonk, 2007). Reflecting on the implementation of this strategy there seemed to be three critical features that led to quality student-to-student interactions: 1) students had to work together to create a product, 2) there was accountability in that students knew the teacher was "looking in" on the nature of their written work providing targeted feedback, and 3) the groups' contributions supported the learning of each member of the group.

Third, students indicated that feedback, another important mechanism for advancing student learning (Schwartz et al., 2016), was better using this strategy than the feedback received in the seated class. Students commented that it was less threatening to receive written feedback in group settings using the comments feature of Google Slides than verbal feedback.

By opening a tab for each group's Google Slide Deck, and using the comments feature, the teacher was able to quickly review each groups' work and provide meaningful "in the moment" feedback. In many instances this involved asking questions to assess or advance the groups' current understandings. Students indicated that the nature of the online feedback was better than seated class feedback for three reasons: 1) there is a written record of teacher feedback that can be revisited at a later time, 2) the teacher can move between each groups' work more efficiently, and 3) since the feedback is written, not verbal, students' have more time, and less pressure, to collectively process and respond to the feedback.

FUTURE RESEARCH

A significant question left unanswered is, "Is there evidence that implementing this strategy leads to a measurable advancement in student learning?". Student responses to survey questions suggest that they believe this was a meaningful learning experience, but more work needs to be done to determine whether there are measurable gains in student learning. Research is currently being conducted to measure whether this strategy supports growth in the quality of students' explanations revealing deeper conceptual understandings of mathematics (Nachowitz, 2018).

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Rethinking online assessments: Screencasting as an evaluation resource

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As we transition to online learning formats in the wake of the COVID-19 crisis, how we assess students has become a common concern among educators. Traditional assessment methods may not always be the best, or most practical, option in online settings. One approach to online assessment is the use of screencasting. While screencasting is often a replacement for lectures in an online environment and has recently been used to provide student feedback, screencasting can do so much more. It can offer a path for students to demonstrate their knowledge and provide insight for instructors on student thought processes. While focused on preservice teachers, the use of screencasts in classroom settings is also examined.

INTRODUCTION

When moving courses online, one common concern is with assessing students (Dyer & Guo, 2012; Khan, Egbue, Palkie, & Madden, 2017), and with the rapid move to online formats due to COVID-19, this concern manifested quickly. Many faculty and instructors have been dissatisfied with traditional types of assessments such as multiple-choice tests or essay questions (Reeves, 2000), particularly when remote situations may not provide the most accurate representations of knowledge. When creating content for this swift change to online teaching, I first found myself creating screencasts to help explain directions and lectures to students. While this helped address the issues with delivering effective content, I was still left with the problem of assessing how the preservice teachers were utilizing and integrating technology into classroom activities. While discussions and written assignments provided some details and looking at activities the students created provided more insight, I still felt I was missing the complete picture of how the preservice teachers were using technology with their students. So, I thought if an instructor can use screencasts to help students understand the course material, why can't students create screencasts to demonstrate their knowledge?

Theoretical Framework

Most screencasting studies focus on the instructor's use, often as a replacement, or in addition to, lectures. Delivering lectures and tutorials with screencasts has many benefits (Abdija, Ahmad, & Nordin, 2018), yet screencasts can do much more. Recently, screencasting has been used as a method to deliver feedback to students (Mahoney, Macfarlane, & Ajjawi, 2019). Limited research exists with students creating screencasts to communicate and demonstrate their understanding. Current studies using screencasts for assessment purposes generally focus on mathematics (McDougall & Karadag, 2008; Soto, 2015).

Research findings have continuously demonstrated that formative feedback tends to improve learning (Black & William, 1998; Dunn & Mulvenon, 2009; Fuchs & Fuchs, 1986). Formative assessment involves more than evaluating students on a task as it aims to improve student learning (Gikandi, Morrow, & Davis, 2011). Even when utilizing technology in online courses, most formative assessment occurs through items like multiple-choice quizzes, quick written responses, and student response systems (McLaughlin & Yan, 2017). When used occasionally, these quick checks for understanding can be good, but they convey limited information and do not demonstrate students complete understanding. Cox, Vasconcelos, and Holdridge (2010) supplied several arguments in favor of supporting multimedia assessment in that they require more of students than simply rewriting abstract ideas in their own words. By investigating a student's thought process and learning potential from student-created screencasts, instructors can provide better feedback.

INNOVATION

Screencasts are video recordings of your screen, often including audio narration. Generally, screencasts in online courses include instructor-created videos used to replace lectures or content. In an online environment, it became necessary to find alternative ways for students to demonstrate their knowledge and teaching skills. By having students use screencasting apps or websites they were able to record themselves demonstrating and talking through the steps or process of how they would use a resource in their classroom. The preservice teachers were able to provide a more in-depth look at how they use technology resources with students, and therefore afforded the instructor the ability to provide more complete feedback.

For the screencast assignment (https://docs.google.com/document/d/1bokEH1pIp5nUpHIPY7jFncgzXzYa03lyj720s-8VgxE/edit), preservice teachers selected an educational technology resource, highlighted the main points of the resource, and described how the technology could be utilized in a classroom setting. They could approach this assignment from different perspectives, including a professional development tutorial or a how-to video for students. While the preservice teachers also wrote a paper highlighting the benefits and drawbacks of the technology resource, creating the screencast required a hands-on approach and gave the instructor insight into the preservice teacher's thought process.

Creating a screencast can be an intimidating task. To help ease anxiety, offer a low-stake assignment (Warnock, 2013) when introducing new technology. The first screencast the preservice teachers created was a practice opportunity and graded on a pass/fail system. Students were not expected to have polished presentations and were told minor mistakes or glitches were acceptable. Short pauses or breaks in explanations did not dissuade the overall message, nor did it impact the instructor's ability to determine the student's effectiveness of using their chosen technology resource in education.

In addition to explaining the purpose of the technology resource, this first assignment only had a few requirements in keeping with low-stakes expectations: a short time limit of three minutes and recording of both the screen and webcam. Having students record their webcams provided insight as to how the preservice teacher might present the information to colleagues or students.

The students created screencasts again as part of their final project where more polished presentations were expected. These final screencasts ranged from five to eight minutes and provided a more detailed presentation of how various technology resources demonstrated one or more of the International Society for Technology in Education (ISTE) standards (ISTE Standards for Educators, 2020).

RESULTS

The screencasts served multiple purposes. In the first screencasts, watching students explain their resources afforded a quick opportunity to gather information and provide feedback about their use of technology resources in education. The final screencast provided a more complete picture of the student's understanding of how various educational technology items could be used and how they relate to technology standards. While the students provided written explanations, the screencasts provided a more in-depth opportunity for the student to learn about the technology and offered the instructor more insight as to how the preservice teacher might integrate the technology in the classroom. Since the screencasts were shared in the learning management system, students also learned about a variety of technology resources from their peers and how they could be utilized in education.

While students were apprehensive initially, the initial low-stakes assignment provided an opportunity to explore the new resource without a significant grade impact, particularly when technology issues arose. In the final class reflection, screencasting was the assignment students found most useful and were able to provide numerous examples for using screencasts in education, including as an assessment tool in the classroom. An unexpected factor emerged with unprompted self-assessments. After creating the screencast, students were able to listen to the recording and see where clarifications or adjustments were needed, often making changes and rerecording the screencast.

IMPLICATIONS

Moving a course online often means rethinking how to teach and assess concepts. In their review of online formative assessment research, McLaughlin and Yan (2017) addressed the main delivery formats including multiple-choice quiz-

zes, one-minute papers, E-portfolios, learning management systems, and student response systems. While good for occasional use, simple, quantitative measurement tools such as these often do not show a student's full level of understanding.

Cox, Vasconcelos, and Holdridge's (2010) support of multimedia assessments noted how these assessments provided diversity and essential technical skills, which are invaluable in our technology-rich society. Multimedia creations require more of students than simply rewriting abstract ideas in their own words. Students must rethink and reimagine the concept in different forms, providing a better method to test students' abilities to deeply understand concepts, which could increase the validity of the assessment (Cox, Vasconcelos, & Holdridge, 2010).

Screencasts can be used for both formative and summative assessments, demonstrating student knowledge, and providing insight into their thought process. For daily tasks, students can provide quick explanations coinciding with visual images. These types of multimedia assessments allow students to create explicit representations of their understanding (McFarlane, Williams, & Bonnett, 2000; McLaughlin & Yan, 2017). For end-of-unit activities, students can use screencasts to explain correct or incorrect choices on exams and present the data or information that supported their decision. Screencasts allows users to demonstrate deeper knowledge of concrete and abstract ideas through verbal and visual representations.

By utilizing student-created screencasts for assessment, instructors can not only examine the end product, but they also look at the student's thought process. There are numerous free and paid screencasting resources for all types of computers, tablets, and smartphones, making the technology easily accessible to almost anyone: Screencast-o-matic, Screencastify, Loom, Zoom, Explain Everything, and Educreations App. These resources are intuitive and easy to set up, making them ideal choices for students with varying levels of technology experience.

FUTURE RESEARCH

Research is needed in utilizing screencasting as an assessment resource. While there has been some research with screencasts and assessment in mathematics (McDougall & Karadag, 2008), the possibilities for assessing students with screencasts extends beyond mathematics. Screencasts can be used with a variety of content areas and with varying age levels. More detailed information and data about how screencasts can be an effective assessment option need to be explored. Past research has looked at the benefits of multimedia assessments (Cox, Vasconcelos, & Holdridge, 2010), but studies on screencasting in education continue to mainly focus on feedback and as replacements for lectures, not for student assessment.

I plan to continue exploring screencasting assessment, surveying preservice teachers about the use of screencasting as an assessment resource in their coursework, and with their students in the classroom. While research supports the use of multimedia assessments, understanding the key elements of effective screencasting assessment is needed. As online learning continues to evolve, how we assess students must adapt as well.

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Using Flipgrid to promote Social and Emotional Learning During Covid-19

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This chapter explores how implementing weekly Flipgrid posts promoted Social and Emotional Learning (SEL), after viewing content-based videos, among 60 undergraduate preservice Elementary students. Using survey data, this chapter will share students' self-reported perceptions of posting weekly Flipgrids and responding to peers' Flipgrids. The survey was based on the following five core competencies of SEL: (1) Self-awareness, (2) Self-management, (3) Social-awareness, (4) Relationship skills, and (5) Responsible decision-making. The majority of students reported that they found Flipgrid to be an effective way to respond to content and maintain SEL.

Keywords: social and emotional learning, Flipgrid, self-awareness, self-management, social-awareness, relationship skills, responsible decision-making, video-based content

INTRODUCTION

SEL leaning has always been an important component of my teaching, but with Covid-19 its relevance was even more apparent. As an Assistant Professor teaching two face-to-face sections of an Undergraduate course titled: Teaching Culturally and Linguistically Diverse Learners, I was most concerned with my students Social and Emotional Learning (SEL) as we unexpectedly transitioned to a pure online format. According to the Collaborative for Academic, Social, and Emotional Learning (CASEL), SEL is "the process through which children and adults acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions" (CASEL, 2015, p. 1).

INNOVATION

With the shift from a face-to-face format to a pure online format, I elected to use *Flipgrid* (http://www.flipgrid.com/) with my students. Specifically, I implemented weekly Flipgrid posts as a requirement for ALL students. Flipgrid is an "easy-to-use social learning, video making website that allows educators and students to make video clips" (Baragar, 2020. p.1). By adding Flipgrid to my newly online course, students were able to still *see* and *hear* from their peers every week. This visual and auditory online component helped maintain a supportive and welcoming learning environment among the students. Additional benefits of Flipgrid included: it was free for teachers and students, it destabilized the traditional structure of the classroom with the teacher as the predominant voice by giving students voice, it was student-centered, and it democratized learning (Murray, 2018).

Students weekly Flipgrid posts were based on what they learned from content-based videos. The content-based videos presented the content normally taught face-to-face. In the final eight weeks of the course, content topics included: Bullying, (Dis)Ability, Religion, LGBTQ, Military Connected Families, Social Justice and Parental Involvement. To ensure that the content-based videos reflected updated course content, I filmed each content-based video over the weekend and uploaded it on *Canvas* (http://www.canvas.net; the learning system used by the university) for students every Monday. Each content-based video reflected information presented in assigned readings and included: pedagogy, video clips, and guest presenters. Videos ranged from forty-five minutes to an hour and fifteen minutes.

Each student was required to individually watch the content-based video at the beginning of the week. By the end of the week, each student was required to record a 3-minute Flipgrid response to specific prompts I posed about the content-

based video. Each Flipgrid assignment was labeled *Culturally Inclusive Teaching and Learning,* followed by the content-topic for the week. For example, during our first week of online classes, the Flipgrid assignment students were required to complete was titled: *Culturally Inclusive Teaching and Learning: Bullying.*

The specific prompts students had to answer for this assignment using Flipgrid were:
1. Briefly tell us where you are, what you are doing (e.g., working, helping family, etc.), and how you are doing overall.
2. What was one new learning you gained from the Content-based Video on Bullying?
3. What was one new insight you gained about Bullying from our guest presenter: Dr. Hughey and her role as a member of the Department of Education Task Force on Bullying?
4. What is one connection you made to your peers Cultural Strategies Presentation on Bullying (i.e., article summaries, children's books they presented, or the strategies they highlighted)?
5. Watch AT LEAST three peers Flipgrids, state their names, and a connection you made to EACH.

As demonstrated in the Flipgird prompts on Bullying, the first prompt students were asked to respond to emphasized SEL. By sharing their response, students were able to feel personally connected to one another. All weekly Flipgrids started with a prompt like this designed to specifically assess students SEL. The second question allowed me to assess what students took away from the content I presented in the content-based video. The third question helped me assess what they learned from the guest presenter. The fourth question was based on a small group presentation put together by students on Bullying (students had been assigned groups at the beginning of the semester based on course topics and given specific guidelines to follow for their presentations). The final prompt helped students make connections to their peers (SEL) as they could see, hear, and learn from each other.

RESULTS

To help me assess the social emotional effectiveness of the students' weekly Flipgrid posts on their SEL, I asked the students to complete a self-reported survey with a 91% response rate. The questions focused on the following core competencies of SEL (CASEL, 2015):
1. **Self-awareness:** Includes the student's ability to assess one's strengths and confidence.
2. **Self-management:** Includes managing stress and motivating oneself to meet personal and academic goals.
3. **Social-awareness:** Includes the ability to empathize with others from diverse backgrounds and cultures.
4. **Relationship skills:** Includes the ability to communicate clearly, listen actively, cooperate and offer help when needed.
5. **Responsible decision-making:** Includes attending to the well-being of self and others.

Five specific questions were posed to students to determine their self-reported rating of SEL as a result of using Flipgrid. Each question specifically identified one of the five SEL competencies. The five questions posed to students in the survey have been identified in Table 1.

Table 1
Questions asked to students about their SEL

		Strongly Disagree	Disagree	Agree	Strongly Agree
1.	To what degree have the weekly Content-based Videos and Flipgrids helped you set academic goals? (Self-awareness)				
2.	To what degree have the weekly Flipgrids helped you build your confidence and understanding? (Self-management)				

	Strongly Disagree	Disagree	Agree	Strongly Agree
3. To what degree has responding to your peers Flipgrids helped you empathize with your peers? (Social-awareness)				
4. To what degree has watching and responding to your peers Flipgrids helped you maintain a relationship with your peers and feel connected? (Relationship skills)				
5. To what degree has completing the weekly Flipgrids helped you evaluate your learning? (Responsible decision making)				

Students were asked to rate their response using a Likert scale with the following ranges: Strongly Disagree, Disagree, Agree, Strongly Agree. Chart 1 displays students' self-rating of their SEL based on these five competencies.
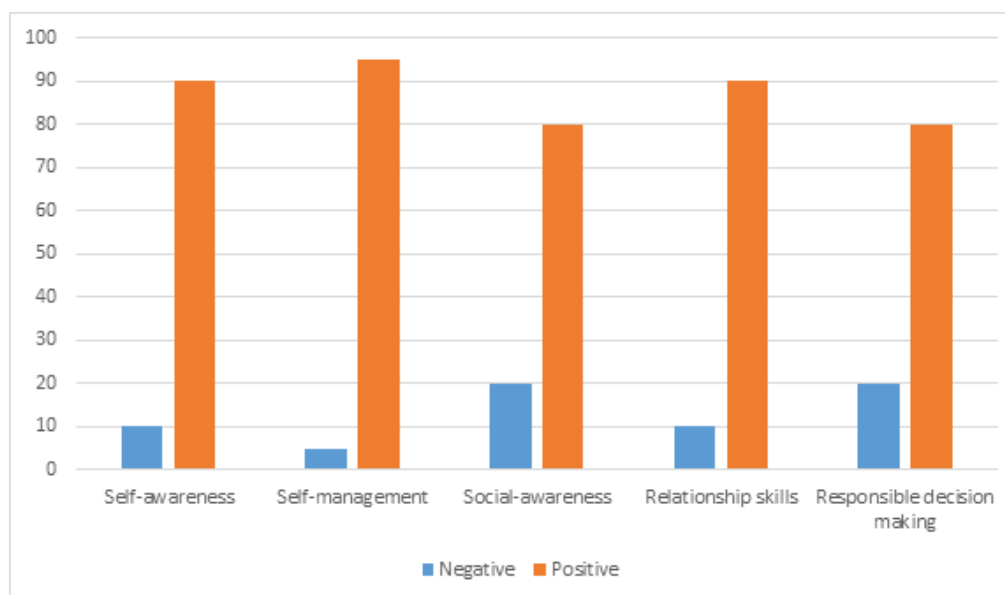
Chart 1. Students' self-reported SEL scores.

Across the five core competencies, at least 80% of students indicated that they agreed or strongly agreed that Flipgrid positively impacted their SEL. For those who felt it negatively impacted their SEL, they may have preferred traditional means such as reading an article and writing a paper.

Based on the students' self-reporting of the effectiveness of Flipgrid, teachers should consider implementing Flipgrid in their own online learning environments. As an educational technology tool, Flipgrid effectively helped bridge the gap between the theory of discourse and social learning and the practice of speaking and using video to communicate ideas (Murray, 2018).

IMPLICATIONS

Based on the survey data given to preservice students, being able to see and hear from their peers in their weekly Flipgrid posts had a very positive impact on their SEL. When developing online learning environments, research by Ludwig-Hardman (2003) found that it is critical to create online learning communities where groups of people are:

"connected via technology-mediated communication and who actively engage with one another in collaborative, learner-centered activities that intentionally foster the creation of knowledge, while at the same time share a number of values and practices." (p. 36).

With Flipgrid, students were able to maintain their sense of community as they were actively engaged with one another. "The design of online, collaborative-learning environments is founded on the assumption that culture matters, that we live and learn in community for a reason, that community-based living and meaning-making is a reflection, to a large degree, of our unique genetic makeup as a species" (Shea, 2006, p. 36). The weekly Flipgrids provided students with a way to actively participate in discourse related to the pedagogy they were learning.

Specific implications for preservice teacher educators when implementing a tool like Flipgrid would be:
1. Create a teacher-video on Flipgrid to introduce yourself and the purpose of the weekly Flipgrids. This not only sets the expectations for students, it shows them that you are not going to ask them to use a tool you would not use yourself (Ludwig-Hardman, 2003).
2. Make sure students understand how to use Flipgrid. There are lots of online video tutorials on how to use Flipgrid such as the one below that can be shared with students.
   Flipgrid Instructions for Students (https://youtu.be/6tfoCgQuqcw).
3. Provide specific prompts that access students SEL (CASEL, 2015).
4. Include prompts that promote student's self-awareness and engage them in critical reflection about the content (CASEL, 2015).
5. Prompts should help students meet personal and academic goals specific to the course (CASEL, 2015).
6. Use peer responses to help students empathize with others and learn from diverse backgrounds and cultures (CASEL, 2015).
7. Provide time limits so students are prepared to communicate clearly and listen actively (CASEL, 2015).
8. Encourage students to attend to the well-being of self and others in their individual and peer responses (CASEL, 2015).

To learn more about Flipgrid and how you might implement it as an instructor, a list of Flipgrid resources has been provided in Table 2.

Table 2
A collection of Flipgrid resources.

Resource	Link
Getting Started with Flipgrid	http://blog.flipgrid.com/gettingstarted
Flipgrid Tutorial	https://youtu.be/-aZ523-HHBg
Flipgrid: Everything You Need to Know by Catherine Ready	https://catherinereadyed.wordpress.com/2020/03/02/flipgrid-everything-you-need-to-know/
Flipgrid: A Model Tech Tool to Practice the Age Old Art of Speaking by Sarah Murray	https://journal.canadianschoollibraries.ca/flipgrid-a-modern-tech-tool-to-practice-the-age-old-art-of-speaking/
How to Use Flipgrid in the Classroom by Allen Baragar	https://www.teachhub.com/how-use-flipgrid-classroom

FUTURE RESEARCH

Continued research on the impact of Flipgrid on SEL while learning content would be a valuable next step. For example, it would be important to have a more nuanced understanding of why some students prefer a video-based format vs. traditional methods. In addition, what might be done to nurture reluctant users of video-based platforms.

The content-based videos shared online for students were created thoughtfully and with careful consideration of students' learning needs (Shea, 2006). However, there are future possibilities for research on the interactivity, style and length of content-based videos. In addition, more qualitative aspects of students experience related to the content-based videos would be helpful. Finally, more detailed analysis of the transcripts of the videos to indicate how the pedagogy presented in the content-based videos helped students articulate their understanding, consider alternative views, reflect and re-think, and integrate new ideas would be valuable.

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Personal Outreach at a Distance: Using Voice and Video tools to Enhance Engagement

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This chapter explores the strategic outreach plans of higher education professionals in an urban, public, broad access institution as they navigate strategic communications to high school students, prospective students, and current enrollees. This study uses narrative analysis from an emerging case study of higher education administrators at Medgar Evers College, a broad access institution in the Urban Northeast. The participants share a real-time experience as they pivot to serve students in the remote environment through student need audits, branded internet programming, and web conferencing to enhance a sense of belonging for current and incoming students. In this brief, we offer emergent findings that suggest personalizing communications for students is a crucial strategy in enrolling and retaining students.

Keywords: intentional intervention, student engagement, enrollment, registration, open access, communication, COVID

INTRODUCTION

As institutions of higher education shift their focus to remote learning, the notion of engaging students takes on a new meaning. A study conducted by Mbuva (2011) examining the retention and success of high school, college, and university students highlights the importance of enacting "positive modeling" when engaging with students from admissions through graduation (p.92). This chapter describes the strategies and outcomes of two professionals at Medgar Evers College (MEC), an open-access senior college in the City University of New York (CUNY) system with a population of approximately 6000 students. Open access colleges are known for their responsiveness to social, economic, and academic needs (Hawley & Harris, 2005). The teachers/administrators developed ongoing, personalized communications to enhance student engagement, retention, and persistence.

Scholarly Personal Narrative (SPN) is the selected method of inquiry. SPN is a constructivist research methodology that uses storytelling to scaffold comprehension and meaning in scholarly research. SPN is unique in that it centers actual experiences and the narrator's interpretation of the experiences within the study (Nash, 2019).

Within this context, Schlossberg's (2011) Transition Theory provides a framework for interpreting students' ability to successfully navigate present transitions, illustrating how these experiences prepare students to handle and anticipate life transitions. Incorporating *situation*; *self*; *support* and *strategies* – this theory guides how potential and current students move into, through and out of the institution. The strategies used to respond to this challenge can be replicated throughout the K-20 environment in response to the need to design intentional student success initiatives (Borthwick & Hansen, 2017; Foulger et al, 2017). The Transition Model can support students while taking the mystery—if not the misery—out of change (Schlossberg, 2011).

INNOVATION

Two administrators at Medgar Evers College are responsible for the development and execution of personalized outreach to identify and retain students who did not register or were slow to register. Their work aimed to meet enrollment projections of both cohorts by increasing students' connectivity with the college in this crisis period. The results of this work address a need that will be present far beyond COVID-19.

Nicole- Director First Year Student Retention and Persistence Initiatives

Personal connection with accepted and admitted students are vital in a student determining their intent to register with the college. Creating a personalized email handle called EnrollwithNicole (EWN) catalyzed to transform communication and student engagement through a virtual platform to meet students where they are. To do so, Hobson's Connect, an admissions and enrollment customer relationship manager (CRM), allows stakeholders to access accepted student's admissions files. Hobson's provides analytics on student interaction with communication from the college, which includes notifications on message activity, registration appointment confirmations, financial aid application filing, and student service programs. This data identifies students who have accepted the offer and made the commitment to attend MEC, subsequently made a registration appointment, but did not register. An electronic file of contact information is sent to Nicole to begin the "warm" transfer, the process of transferring a student to a staff member after an initial triage contact.

A check-in email is sent to confirm continued interest and to troubleshoot barriers to registration. The outcomes of check-in messages guide the next level of communication between Nicole and campus resources, such as the academic advisement center, freshman year program, and various academic and support service programs such as the Percy E. Sutton Search for Education, Elevation and Knowledge (SEEK) and the Accelerated Study in Associate Degree (ASAP) programs. EWN serves as a triage service for questions about financial aid, health services, and information for differently-abled students. The program goals address student concerns and ensure they are registered. Personally connecting students with someone at the college helps them to navigate a systematic admissions process (Appendix), establishing a personal, trusting relationship.

Charlotte, Community Outreach Program Manager

An outreach project was initiated to contact continuing students, with the belief that future enrollment projections will be met by increasing students' connectivity with the college in this crisis period. The primary mode of contact was to be by Google Voice, which allows for alias telephone numbers and record-keeping via Gmail. Administrators from various campus units collaborate to perform student outreach while working remotely. The process included a script to help discern 1) overall wellness of student and household; 2) comfort level/challenges of online learning; 3) status of fall registration and 4) connectivity and referrals to campus resources, including advisement, information technology, and the campus pantry. Some 3000 students were targeted; Charlotte's direct caseload is 100 students in the School of Liberal Arts at all levels.

RESULTS

Of 3187 students in the outreach project, 2501 were contacted with a total of 766 conversations. Fall registration increased by 10% over this period; however, it is unclear how much of this jump is from the impact of this initiative, relative to outreach from other administrative and academic units, or self-initiated registration by students. What is clear from the feedback is that amid a crisis, students welcomed and responded to personal outreach from their school. Charlotte found that students shared feelings of appreciation for personalized outreach and interactions. Of the 44 students contacted through EWN, 43 are currently registered. The personal engagement between Nicole and her students, though early, shows promise in increasing the number of students contacted through the initiative on campus.

While the administrators in this study have differing job responsibilities, recurring themes connect the experiences of outreach and personalized communication. The outreach provides essential information to assist students. Examples of student information gathered include grief over the loss of family and friends, limited/no access to a laptop, and communication issues with advisors. Several students expressed challenges in communicating with instructors. There was an even split of students who know who their advisor is. Despite this, a smaller group was in contact with their advisor regarding course choice and registration. Students stated that they are unsure as to whether they would return in the fall if online classes are the only option. Throughout both outreach efforts, referral lists of specific students' needs were made and forwarded to the bursar, financial aid, IT, and Student Affairs. Nicole found that there were inconsistencies in the experiences of student onboarding by program or student service office, and sought to personalize services that would bring students up to speed.

IMPLICATIONS

The emerging data from this study makes evident the need for personalized, non-conventional approaches to promote student participation. Triage for students in crisis and a holistic approach to student support and engagement continue to yield results, as such, exploring personalization through 1:1 and small group communications is an essential component in student success plans.

With the influx of online instruction comes a level of professional training needed to promote student engagement. Although technology has evolved, pre-service teacher training programs are lacking in training for remote engagement (Muilenburg & Berge, 2015; Moore-Adams et al., 2016). This study explores what it entails to be an online learner or teacher (Moore-Adams et al., 2016) and offers real-time examples of engagement in practice.

Students have shared feelings of appreciation for personalized outreach and interactions, characteristics necessary to facilitate change, as noted in Schlossberg (2011). Helping staff and teachers to understand students' development is critical information needed to foster attachment and growth (Darling-Hammond et al., 2020). Students expect a response from institutions and teachers to deliver safe, personal, and technologically flexible ways to engage. These are especially important considerations for Pre-service teachers, who act as both teacher and student.

The interventions described in this study retain students, offering an opportunity for genuine communication outcomes: EnrollwithNicole offers a direct link to a specific person, not an administrative unit; similarly, the outreach telephone calls and emails emanated from dedicated individuals like Charlotte give a "personal face" to institutional outreach. Student success in this environment requires the creation of spaces and practices attuned to students' learning and developmental needs; critical thinking/problem-solving skills; the ability to analyze, synthesize, and apply knowledge to novel situations; and the development of interpersonal skills that allow them to engage effectively with others (Darling-Hammond et al., 2020). Successful outreach over multiple platforms can also support the challenges of connectivity that the most vulnerable students face.

These outreach methods are low-risk, high reward propositions for remote staff. Student engagement is a necessary component of students' developmental experience. Though uncomplicated in approach, the results here imply that regardless of modality, finding a mutual, meaningful connection is necessary for engagement.

FUTURE RESEARCH

The narrative experiences of this targeted outreach are part of a more extensive, emergent study; additional data will refine the results to provide data on specific outreach interventions that make the most impact on student retention. Future research is needed to understand how students respond to personalized communication. Student feedback on the efficacy of these and similar outreach programs will help educators to continue to refine their responses, using personal outreach to increase engagement. Addressing retention and being responsive to the needs of students in transition will be instrumental in maintaining enrollments and providing nuanced service to students in these challenging times.

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APPENDIX A

ADMISSIONS FLOWCHART, MEDGAR EVERS COLLEGE

Fall 2020 Enrollment Process

Legend
Yellow = Letter
White = Process
Blue = Decision
Purple = Active at any time

Enrollment Start

- President Letter
- ASAP Intro
- SEEK Intro
- Admissions Acceptance
- File for Financial Aid
- Pre-registration Checklist
- Athletics Introduction
- School of Education Intro
- School of Liberal Art Intro
- School of Science Intro
- School of Business Intro
- Ability to benefit
- Residency Form
- Missing Documents

* Financial Aid Process On-going

- Recruiters Intro
- Recruitment Follow up

Application Submitted

Admission Receive Recommended File → Recommended File Processed → Recruiter Caseload Generated → Recruiters Direct Applicants to Accept the Offer

- Transfer Credit Evaluation Complete

Credit Evaluation Needed ← Yes ← Admissions Matriculate & Term Activate Record ← Yes ← Offer Accepted → **No**

Transfer Credits Evaluated → Compile Daily Files of Ready to Register Applicants → Share file

No

| AAC | ASAP | FYP | Education | SEEK |

Enrollment Process Ends

Advise/ Register

Yes

Fully Paid Tuition ← Bill generated ← Yes ← Register → No → EM Coaching

No → Bursar Bill

685

Using Motivational Videos to Support Student Engagement

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During the spring 2020 semester, teacher preparation programs experienced an unexpected move to fully online instruction due to COVID-19. For fully online programs, such as the Special Education master's degree program at Colorado Christian University, this change did not impact instructional delivery. However, fully online programs did need to make adjustments to address students' sense of community, engagement, and emotional well-being during the pandemic. In order to support students during this time, the researcher created and disseminated short motivational videos to students in the program twice per week. A brief online survey was conducted to understand how the videos impacted student engagement; the preliminary survey results are presented.

INTRODUCTION

COVID-19 impacted the emotional health of many, including pre-service and in-service teachers. The Centers for Disease Control and Prevention (CDC; 2020) note that common responses include (a) concerns for self and others, (b) feelings of guilt, (c) feelings of isolation, and (d) increased levels of distress. A connection to community has been found to be a protective factor for the negative impacts of stress and trauma (Schultz et al., 2016). In addition, for students in online courses, a sense of community is correlated with student (a) engagement, (b) learning, and (c) satisfaction (Seckman, 2014) and can be considered one way to offer the UDL principle of multiple means of engagement in online coursework. UDL is an instructional framework that meets the unique learning needs of all students through offering multiple means of (a) engagement, (b) representation, and (c) action and expression (CAST, 2018).

Colorado Christian University offers a fully asynchronous online master's degree program in Special Education. The program has multiple pathways, including traditional initial teacher licensure, alternative certification, and a non-licensure pathway for in-service teachers. Using a cohort model, students in the program take courses together for five semesters. The majority of students in the program are working adults who chose the program due to the flexible nature of online learning (Lohmann et al., 2019). The Colorado Christian University master's degree program in Special Education has intentionally worked to build community and engage online learners (Lohmann et al., 2018). During times of crisis, this sense of community may help to address the feelings of isolation that are common.

INNOVATION

Student engagement has been a focus of the researcher and previous research (Lohmann et al., 2018) indicates that student engagement is increased through: (a) phone calls from the professor, (b) instructor availability, (c) Twitter chats, and (d) optional synchronous sessions. Building on the already-existing community structure, the researcher supported students during the pandemic through motivational videos that were disseminated via email to all students in the program, regardless of whether they were currently taking a course with the researcher, twice per week. Videos were recorded using Zoom and uploaded to the cloud; students were provided a direct link to the video in emails. Each video was one to three minutes in length, included a transcript to ensure that all viewers could fully access the content, featured the researcher talking to students, and were unscripted, but based on a topic chosen for the specific video. The researcher used a variety of images as virtual backgrounds for the videos; backgrounds were chosen based on the specific theme of the video or student request. For example, an ocean image was used when the researcher discussed the idea to "keep

swimming," a screen of balloons was used to celebrate the students during the final week of the spring semester, and Frozen's Olaf on the beach for the first day of the summer semester. The videos included messages of encouragement, personal stories, and calls for student to share with the researcher and with fellow students about challenges and joys during COVID-19. After each video, the researcher received email responses from students indicating they appreciated the encouragement and sharing their own stories. Figure 1 offers the transcript of one video.

> Good morning, special education students. Today is Thursday, April 23 and this is Dr. Lohmann coming to you from a sea of balloons. Today, I want to celebrate you guys. I want to celebrate the fact that we have reached the end of the Spring 2020 semester. Classes end this Sunday and I want to celebrate the fact that you have made it through. It has been a challenging semester and you have stuck with it. You have worked hard. You have pushed through all of the challenges in the schools where you work, in your homes, in your communities, and here at Colorado Christian University. Today, I want to celebrate that. I want to celebrate the fact that you all are amazing. You are worth celebrating. Great work this semester. I am so incredibly proud of every one of you. Thank you for what you have done this semester and for being awesome and fabulous. Today, I challenge you to take a few minutes to celebrate you and celebrate what you have accomplished in the midst of unprecedented craziness this semester. I am so thankful to work with you all. I am so proud of all of you. Have a beautiful weekend and I am excited to talk to you all again next week at the beginning of the summer semester.

Figure 1. Sample Motivational Video Transcript: Last Week of Semester.

RESULTS

In order to better understand the impact of the videos, a short survey with open-ended questions was sent via email to each student (see Appendix). Due to the short timeline in which the researcher desired to evaluate the results, the survey was open for just four days. Of the 56 students who received the videos and an invitation to participate in the survey, 13 responded for a response rate of 23%. Forty-six percent of respondents (n=6) indicated viewing all the videos, while the other seven students reported they viewed some of the videos. All respondents reported the videos were encouraging and responses included "uplifting and let us know that we are all in this together," "positive and comforting," and "I was inspired to be more positive." In addition, respondents reported they would like to continue receiving the videos; additionally, they would like to see fellow students in some videos. Despite the positive statements about the videos, the majority of students (61.5%; n=8) reported the videos only had a moderate impact on their sense of connection to the program and the university. These results indicate the videos may impact student attitude and emotional well-being, but not student sense of community. It is possible that the results are skewed due to response bias as respondents chose to participate and may be the students who most appreciated the videos (Ravid, 2011).

IMPLICATIONS

Due to the reported impact of this intervention, the researcher will continue using twice-weekly videos to support students throughout the summer semester and has suggested to colleagues to utilize motivational video messages for their students. In order to ensure that the videos are relevant on the particular day they are sent to students, the researcher will choose topics based on requests from students, as well as questions and concerns that have arisen from both students in the program and current special education teachers. Beginning in June 2020, the researcher has asked current and former students, as well as other faculty members, to help create videos, with the plan that one video each week will be the researcher and the other will feature someone else. Starting in the fall 2020 semester, the researcher plans to continue with regularly scheduled videos to students, but change the format and frequency. Tentative plans are to send a video link every two weeks, with videos including both motivational messages from the researcher and fellow students, as well as short presentations from in-service teachers and education scholars regarding topics of interest and relevance to the Colorado Christian University Special Education students.

Based on the preliminary data, motivational videos may be a good solution for connecting with online teacher candidates and in-service teachers, both during times of crisis and during typical semesters. Based on the current litera-

ture, the researcher recommends using videos as just one aspect of a comprehensive approach to engaging online student; additional practices include: (a) the use of social networking (Habibi et al., 2018), (b) facilitating online discussions (Lee & Martin, 2017), (c) providing rubrics for all class assignments (Martin & Bollinger, 2018), and (d) professor accessibility through various methods (Lohmann et al., 2018). By actively engaging learners in the online classroom with strategies such as these, faculty can reduce student attrition rates (Deschaine & Whale, 2017) and increase student satisfaction (Martin & Bollinger, 2018) and academic achievement (Bonafini et al., 2017). In addition, the researcher believes that universities should consider keeping a repository of the videos created so that faculty can use them in future semesters; this will be especially beneficial for videos that have been created to showcase leaders in the field discussing best practices in teaching.

FUTURE RESEARCH

Further research is needed to better understand the impact of student emotional well-being during times of national crisis, as well as effective interventions to address emotional health. The researcher plans to continue examining student engagement in online programs, as well as the impact of engagement on student learning and persistence. Specifically, the researcher plans to collaborate with colleagues to conduct interviews regarding the use of motivational videos. In addition, the researcher is collaborating with colleagues in other online programs to implement a similar intervention; this replication data will allow an examination of the impact of the videos alone versus their impact in a program focused on engagement.

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APPENDIX A

SURVEY SENT TO STUDENTS

1. Are you aware that you have been receiving motivational videos via email over the past few weeks?

    a. Yes

    b. No

2. Have you viewed the videos?

    a. Yes, I have viewed all of them

    b. Yes, I have viewed some of them

    c. No, I have not viewed any of them

3. Please explain why you chose to view the videos or chose not to view them.

4. What is your impression of the videos?

5. To what extent do you feel that the videos help you to feel more connected to CCU during this time of crisis? (scale of 1-5 with 1 being "does not impact my connection" and 5 being "significantly increase my sense of connection")

6. Would you like to view videos from fellow CCU special education students?

    a. Yes

    b. No

7. Please explain your answer to Question 6.

8. Would you like to view videos from current teachers or other experts in online education?

    a. Yes

    b. No

9. Please explain your answer to Question 8.

10. What changes would you like to see to future videos?

11. What additional information would you like to share with the researcher?

Best Practices for Online Language Teaching with 360-Degree Videos

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Although numerous software and applications exist for learning languages with technology, it has been argued that online learning in language programs has been slower than in other fields (Lord, 2014). However, due to the uncertain pandemic circumstances, recently language teachers had to move their courses to online digital spaces. This brief chapter presents strategies and best practices for teaching languages online in the context of higher education with 360-degree videos, with a focus on communication and interaction, which are essential components of language development. These videos provide students with immersive and authentic experiences which can be highly valuable, considering that traveling is not recommended during a pandemic.

INTRODUCTION

The landscape of computer-assisted language learning (CALL) has been widely investigated, and teachers and researchers have discussed the use of a variety of tools that support language acquisition. For example, Xie, Ryder, and Chen (2019) investigated the use of interactive virtual reality (VR) tools in an advanced Chinese course; Berti, Maranzana, and Monzingo (2020) looked at 360-degree videos paired with Google Cardboard headsets to foster cultural understanding among Italian language learners. Nevertheless despite the existing literature on CALL, a strategic use of technology in language education is still peripheral and even traditional CDs found in language textbooks remain unused (Di Sparti, 2016). When considering the use of 360-degree videos and VR in online language teaching, even more is unknown in relation to strategies and best practices for effective pedagogy. Thus, this paper presents practical suggestions for teaching languages in online spaces with 360-degree videos, also called low immersive VR. Such technology is especially relevant during a pandemic since students are not able to visit the countries where the studied language is spoken due to travel restrictions. In low immersive VR environments students can experience the target language and culture directly from their homes.

INNOVATION

Differently from highly immersive VR, which requires the use of a headset paired with a smartphone or a head-mounted display, low immersive VR can be simply experienced through a computer display or a mobile device. Digital literacy (Son, Park, & Park, 2017), situated learning (Christoforou, Xerou, & Papadima-Sophocleous, 2019), and experiential learning (Berti et al., 2020) are the central pedagogical principles that support the use of this technology in language courses. In collegiate institutions, more and more students own smartphones or devices of some sort (Pew Research Center, 2019) which can be used to experience authentic and contextualized virtual environments. Sites like YouTube offer low immersive VR experiences through 360-degree videos, in which the user can drag the mouse, or click on the arrow symbols on the top left of the screen, and explore the real environment in all directions.

An innovative site that allows users to map low immersive VR videos is StoryMap, an online platform developed by Northwestern University Knight Lab. Through this free-to-use authoring tool, teachers and students can create interactive maps with embedded 360-degree low immersive VR videos. Users can set the location of the embedded video and create a storyline for language learners. An example of a StoryMap can be found at https://www.italianvroer.com/italy-map/. In

this example, the user can explore various culturally-rich 360-degree VR videos, showing up in various locations in Italy. When a video is played, the user can explore the virtual environment by dragging the mouse and can listen to Italian language speakers interacting within the environment. For online language learning, the teacher can create a StoryMap and pinpoint low immersive VR videos from the countries where the studied language is spoken. Following, the teacher shares the link of the created map with students, asks them to choose a specific environment (or video), and discuss on the learning management system (LMS) or through live discussions on Zoom what was seen, heard, and observed in VR. As students discuss their experiences and what parts of the environment were most interesting to them, they communicate in the studied language. Alternatively, students can collaborate online in groups, develop their own StoryMap, and then share their creations with peers explaining the reasons why they selected specific videos and what they learned about the studied culture and language.

Another example is the use of 360-degree videos, directly from YouTube. Through targeted searches with the keyword "360," for example "Spain 360," spherical videos will be found. These videos can be embedded in the LMS and used for learning activities addressing both the studied language and culture. An additional example is Italian VR OER, https://www.italianvroer.com/, a site that offers resources and tools for using 360-degree videos in Italian language courses.

RESULTS

Through the use of low immersive VR in online language courses students are given the opportunity to be creative in their learning process and explore authentic environments from their homes. Generally, low immersive environments as Second Life and OpenSimulator have shown to provide numerous opportunities for "immersion in linguistic, cultural and task-based settings" (Blyth, 2018, p. 227). Likewise, StoryMap, YouTube, and other sites, offer users the opportunity to immerse themselves in contextualized 360-videos and explore such settings from multiple perspectives through the mouse-dragging feature. Students and teachers can create storylines to be explored and experienced in online digital spaces. Through structured questions, students reflect on the studied language and culture while also engaging in personalized and situated learning experiences. Since traveling is not possible during a pandemic, these 360-degree videos can certainly help and provide students with authentic learning experiences.

Research in the area of low immersive VR for language learning has found that such technology can effectively reduce learning barriers, such as anxiety and inhibition, and increase students' engagement and motivation (Lin & Lan, 2015). Shih (2015) examined the effects of low immersive VR on cultural learning with four university-level English learners in Taiwan. Using Google Street View 360 images and under the guidance of an English-speaking instructor, participants virtually explored the British culture. Data suggest that the virtual experience enhanced learners' interest in the target culture. In another study, Shih (2018) developed immersive environments in which students completed goal-based language learning activities, such as describing the environments in the target language, locating virtual buildings, and exploring virtual sites in New York and London. The participants reported that they enjoyed completing the tasks and felt stimulated to use the studied language. All in all, these results show significant benefits of using low immersive VR technologies with language learners.

IMPLICATIONS

Just as with other subjects, online language teaching differs from face-to-face teaching. When learning a language online, students must be given opportunities to be creative and interact with each other. On the other hand, the teacher should function as a facilitator, who guides and assists students in learning processes. The following strategies should be considered by pre-service and in-service teachers who choose to integrate low immersive VR in online language teaching:

1. Among the objectives of language learning there is the goal to use the language communicatively, and thus students should be given the opportunity to communicate in diverse modes. For example, the teacher puts students in pairs for half semester and every week the students meet online to use the vocabulary they learned through the VR videos. Students record their meetings and share them on the adopted LMS. Students should also have the opportunity to express themselves in multimodal written forms, utilizing available educational technology tools, such as discussion boards (Hampel & Hauck, 2006).

2. In the context of higher education, students should also be given agency and practice "intercultural communication in the wild" (Thorne, 2010, p. 20). By taking advantage of online language speakers, students explore the culture and learn language through interactions. In the VR videos, students listen to authentic language in context (Kaplan-Rakowski & Gruber, 2019) and also comment under the videos and communicate with speakers of the target language. Following, students can report their interactions to the teacher and peers on the adopted LMS.

3. While students may be paired up for weekly interactions discussing the VR videos, they should not be required to attend synchronous language lessons. Many have argued that synchronous lessons are not effective in distance courses (Hsiao, 2012), and in the context of language pedagogy the teacher should implement the flipped approach (Evseeva & Solozhenko, 2015). That is, students individually watch previously-recorded lectures and then practice what they learned, i.e., vocabulary and grammar structures, independently and with their peers.

4. Not all students have technology tools for learning languages in low immersive VR. Although in the context of higher education the vast majority of students own mobile devices and computers, it is possible that some of them may not (Allen & Seaman, 2016). For this reason, before implementing activities that require extensive collaboration between peers and VR viewings, which do require a good internet connection, it is important to ensure that students have the tools to be successful. Furthermore, it is important to keep in mind students' knowledge and skills regarding technology tools (e.g., StoryMap) and provide tutorials and support as needed.

5. Depending on the technology skills and abilities, the learning curve for pre-service and in-service teachers for utilizing low immersive VR can be steep. For this reason, educators need to be provided with the appropriate support for utilizing this technology in their online language courses. The support can be informal, from online training guides and videos, or formal, from the office of instruction and technology from one's own university or institution.

FUTURE RESEARCH

Through these strategies, students can be effectively engaged in low immersive virtual environments in online language courses, while also developing collaborative and communicative practices. When reflecting on online teaching, both pre-service and in-service educators need to think differently and outside the box to ensure that students are motivated to continue learning. That can be accomplished, for example, by using new technologies such as VR which allows students to virtually travel, directly from their homes. Future research should explore how low immersive and highly immersive virtual environments compare. Although low immersive environments have received a lot of research attention, highly immersive VR is new to the landscape of language education, especially concerning the online setting, and a comparison between the two could provide useful insights in terms of student engagement and learning effectiveness.

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Using Recorded Online Meetings to Support Remote PD Program for UAV Drones

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Due to the current public health crisis, teacher professional development training is shifting online to continue the efforts of enhancing computer science teacher capacity. Many high school computer science teachers, however, report not being fully-prepared to teach computer science, and the online format brings special challenges for physical computing topics. Troubleshooting, or debugging software and hardware related issues, is particularly difficult through videoconferencing compared to an in-person setting. This work aims to use recorded online meetings to support a remote UAV drone professional development program that focuses on active experiential learning for high school in-service teachers. By encoding and analyzing the activity patterns of the video data, we show that collaborative in-sync tasking was essential for successful troubleshooting. The video data can also be indexed into a video library to support teacher training as well as for sharing their remote learning experience.

Keywords: remote learning, physical computing, video data analysis

INTRODUCTION

More than two thirds of computer science teachers report not being fully-prepared to teach various aspects of computer science (Gordon & Heck, 2019). One of the key factors for successful professional development designed to support teachers in implementing computer science curriculum is the focus on active experiential learning (Meneske, 2015). Physical computing relates to the creation of computing artifacts using programmable tangible media integrated with sensors and actuators. As part of the NSF-funded project, "A Gateway Drone for High School Students", a summer remote professional development (PD) session will be held for in-service teachers from the New England area high schools. The teachers will each receive a low-cost autonomous robot drone kit and learn to build, program, and fly an autonomous Unmanned Aerial Vehicle (UAV) drone. The training consists of topics in drone safety, circuitry, soldering and Python programming. Teachers will learn to work with sensors and actuators, e.g., infrared (IR) sensor, inertial measurement unit (IMU) and camera. A partially built drone is shown in Figure 1.

Given the highly hands-on nature of the content materials, supporting teachers' learning remotely, such as remote debugging the hardware construction and software configuration, poses a real challenge. Remote learning requires additional support for troubleshooting various unexpected software and hardware issues that occur with hands-on active learning activities. For example, one loose wire connection can cause the whole system to fail. Resolving such issues remotely is much harder than in an in-person setting. Since teachers tend to replicate the learning activities they experienced during PD (Martinez, Gomez, Moresi, & Benotti, 2016), it is thus important for teachers to develop effective problem solving strategies and to experience various troubleshooting scenarios that may arise in their own classrooms.
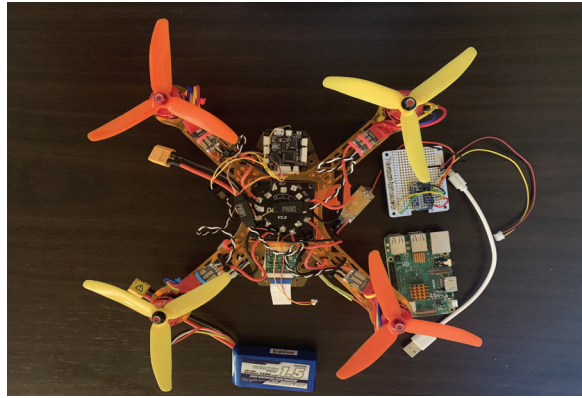
Figure 1. A partially constructed UVA drone used in our PD program.

Remote labs have been used in teaching physics and engineering with positive results (Corter et al., 2007; Dziabenko, Olga, & García-Zubía, 2013), but the settings are often limited in virtual simulations rather than hands-on physical devices. Issues related to remote troubleshooting in the context of physical computing have not yet been adequately addressed in the literature. In this work, we use video recordings of the online Zoom meetings as a tool to improve teachers' training in the context of physical computing platforms.

INNOVATION

Video data has been used to analyze the process of teaching and learning (Corter et al., 2007; Dziabenko, Olga, & García-Zubía, 2013), and they provide detailed records from which we can discover insights regarding participants' interaction from both quantitative and qualitative analysis (Angelillo, Rogoff, & Chavajay, 2007; Ramey et al. 2016). In this pilot work, recorded Zoom meetings are used innovatively to improve teachers' learning and practice on the UAV drone platform in two different ways.

First, by encoding and analyzing the videos of some successful online support sessions, we can identify patterns for effective troubleshooting through open videoconference tools, e.g., Zoom or Google Hangouts, and thus help the teachers be better engaged in learning the content materials as well as gain pedagogical skills to implement the UAV drone course. We have designed an activity event code scheme to classify different types of activities the teacher may be engaged in. An initial set of seven event types was identified as shown in Table 1. In this pilot work, the goal was to identify teachers' activity and interaction patterns present in a successful remote troubleshooting session using video data coded with this scheme.

Table 1
Encoding Scheme for Video Analysis of Online Meeting Recordings.

	Teacher Activity Event	**Description**
1	Check-in	Confirms or describes the current working progress
2	Collaborative Task	Works on the same tasks simultaneously together with the coach
3	Guided Task	Work under the instruction by the coach
4	Independent Task	Performs independent work with limited or no instruction from the coach
5	Screen Sharing	Uses the screen share feature to show computer screen with the coach
6	Camera on object	Uses a camera to show hardware objects
7	Text chat	Uses the chat room feature to send texts

Secondly, the video data will also be collected as a video recourse hub for teachers to share their own learning experiences and success stories. The video recordings will be categorized given its content topics and curated as an indexed video collection so teachers can search for solutions as they run into technical problems during or after the PD. As the

current pandemic may cause teachers to feel more isolated in the PD training, our video hub serves as a powerful tool for promoting connectedness and individual reflection. Creating a space where teachers can reflect on their own problem solving is an important professional development opportunity.

RESULTS

A pilot PD support session was conducted with a volunteer teacher participant. The teacher encountered technical issues while working offsite, and a coach was able to resolve the issue remotely over a one-on-one Zoom meeting. The 51 minutes meeting was recorded using Zoom's build-in record feature. The video was then encoded with the activity coding scheme. The video was divided into 1-minute segments, with each segment encoded by the activities events (in Table 1) occurred. Multiple events may be recorded for a single segment.
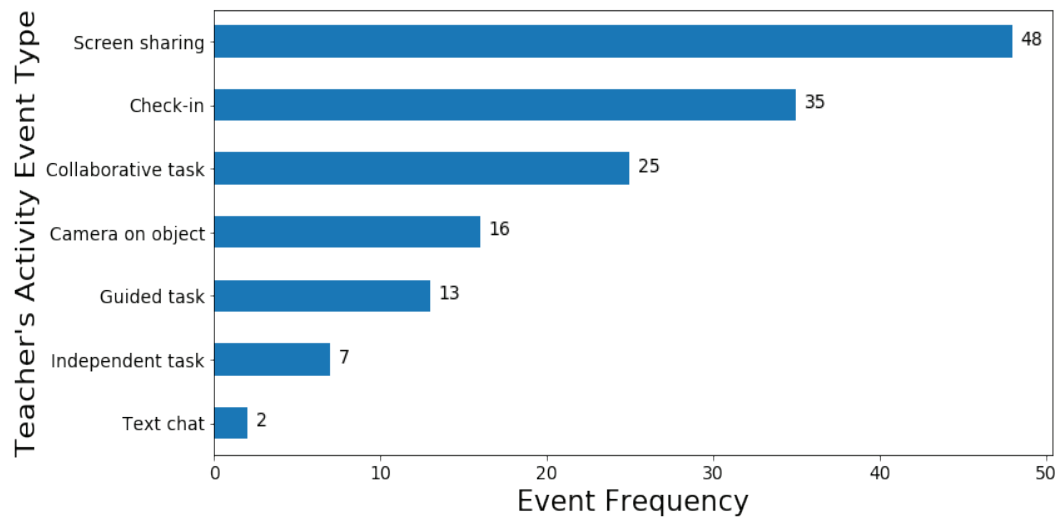
Figure 2. Frequencies of Teachers' Activity Events during the 51-minute Video Data.

The encoded video data was analyzed quantitatively and the preliminary results are shown in Figure 2. The top three activities all relate to highly collaborative and in-sync tasking. For example, screen sharing was present in 48 segments while the participants constantly updated their work progress in 35 segments, e.g., confirming the system configuration and the current steps in the build manual. The coach and the teacher were highly engaged in performing the same tasks while trying to reproduce and identify the error. The coach was able to determine early on that the issue was software related, thus the 'camera on object' event occurred in only 16 segments. In comparison, activities of the guided (13 segments) and independent (7 segments) types happened much less frequently during the meeting. This session of online support is also indexed according to the build manual of the UVA drone so it is searchable in our video collection.

IMPLICATIONS

Remote PD with well-configured online troubleshooting support is essential to prepare pre and in-service teachers with pedagogical skills and content knowledge teaching physical computing content. Due to the hands-on nature of physical computing devices, unexpected hardware or software issues often arise even if the curriculum materials are well designed. Recorded online meetings provide a tool to improve teacher training and their competency in content implementation. The video analysis results of the UAV drone debugging session indicates that highly collaborative tasking is essential for successful remote troubleshooting. Compared to guided or independent tasks, activities that promote mutual collaboration (e.g., screen sharing and progress check-ins) are essential to detect and resolve technical issues. Also, video recordings can be indexed and curated as part of the online recourses to support asynchronous instruction. Therefore, we recommend the following best practices in designing effective remote PDs that involve hands-on computing devices.

1. Provide high-quality materials to maximize off-site learning before the PD session starts. Even for teachers with prior experience in computer science topics, new computing platforms including the hardware devices can still be challenging. The hardware kit should be delivered to the teachers in advance so that the teachers can be familiarized with the devices and start working on some scaffolding activities.

2. Engage teachers with synchronous tasking along with the instructor during the remote PD meetings. It is important to establish a shared virtual working space with teachers through real-time collaboration. For example, design active learning tasks and have the teachers work on a sequence of tasks along with the instructor and use teleconference tools such as screen sharing to enhance communication. Breakout rooms are a great tool for teachers to collaborate in smaller groups (Bower, 2007).

3. Record online meetings and use the video data as an indexed video resource as well as a tool to help teachers to reflect on their own learning experience and remote problem-solving (Huppertz, Massler, & Ploetzner, 2005). This may involve obtaining the consent from the PD participants and establishing a secure website or service to host the videos. Besides being used as troubleshooting recourses, these video data can provide teachers with insights on how to implement a remote learning environment in their own online classrooms.

FUTURE RESEARCH

The recorded online meetings provide us with opportunities to improve remote online PD as well as to answer research questions through quantitative and qualitative analysis methods. The preliminary quantitative data analysis presented in our work provides several direct extensions to future research. A larger-scale study can be performed as more recorded meeting data are added into the corpus, and thus help us identify design features that are associated with program effectiveness. Another extension of future work is in understanding how the sharing of recorded video may impact teachers' self-efficacy through working with physical computing topics and their implementation of instructional practices.

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Supporting In-Service Kindergarten Teachers for an Effective Online Phonological Awareness Instruction

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Effective early literacy instruction is key to preventing future reading problems. One critical early literacy skill young readers should acquire is phonological awareness (PA). With the pandemic period still in progress, teachers are likely to continue teaching either online or in a blended format. Moving into an online environment requires kindergarten teachers to identify digital tools and online activities that provide engaging early literacy opportunities to young readers. The purpose of this chapter is to describe a user-friendly digital tool, the ThingLink, and the instructional steps a teacher could take to design and implement when teaching PA activities. We were able to pilot test ThingLink with a small group of teachers and families during the pandemic crisis and obtained valuable input for tool refinement and delivery. We present major pilot testing findings along with implications for in-service teachers and families.

Keywords: pandemic, phonological awareness, digital tool, ThingLink, interactive environment, kindergarten, in-service teachers, reading

INTRODUCTION

When pandemic crisis forced public and private preschool settings to close unexpectedly for more than two months in Cyprus, in-service teachers were trying to identify engaging literacy activities to support student reading needs. Our research team worked with a small group of in-service kindergarten teachers to assist with digital instructional content. As a result, we focused on identifying easy-to-use, free-to-access online tools that could provide early reading instruction opportunities to classroom teachers.

We considered developing and pilot testing instructional content based on the principles of beginning reading. For more than two decades, researchers have documented that beginning readers, especially those at risk for reading failure, need instruction on specific reading skills such as phonological awareness (PA) skills. Phonological awareness has been defined as the awareness of, access, and manipulation of sound structure of one's oral language (i.e., phonemes, syllables, words) (e.g., Anthony & Francis, 2005; Georgiou, Parrila, & Papadopoulos, 2008; Parrila, Kirby, & McQuarrie, 2004). Examples of PA skills include initial/middle/final sound recognition, elision, substitution, and blending in syllables, words, or sentences.

Research showed that systematic and explicit instruction on PA produced the strongest growth in reading skills for pre-school and primary level children (Foorman & Torgesen, 2001; Hatcher, Hulme, & Snowling, 2004) and it is important for all students who learn an alphabetic language (i.e., Eunice Kennedy Shriver National Institute of Child Health and Human Development, 2000). Such findings highlight the importance of preventing reading problems by targeting early critical literacy skills (e.g., PA) in preschool years. While a plethora of PA curricula is available for conventional instruction (e.g., Adams, Foorman, Lundberg, & Beeler, 2006), limited teaching tools exist for online PA instruction. The purpose of this research work was to design and pilot test digital PA activities, with the use of free-to-access online tools, for promoting student active responding and reading engagement.

INNOVATION

Our research team, consisted of two faculty experts on beginning reading and reading difficulties prevention, contacted five in-service kindergarten teachers with more than 10 years of teaching experience to seek their participation in pilot testing e-learning PA activities. The following instructional design and implementation steps were carried out for creating online PA activities with the use of a free-to-access digital tool. First, several PA activities were targeted based on PA skills (i.e., elision, blending, recognition, segmentation and substitution). Our PA activities had been identified from an existing bank of PA tasks developed and presented in previous face-to-face professional development in-service teacher seminars. Examples of PA activities are listed in Table 1.

Table 1

List of PA activities

PA Task	Examples	Expected Student Responses
Rhyme recognition	1. Do *moon* and *spoon* rhyme? 2. Do *lamp* and *camp* rhyme? 3. Do *cat* and *cake* rhyme? 4. Do *fox* and *box* rhyme? 5. Do *bat* and *box* rhyme?	1. Yes, they end with /oon/. 2. Yes, they end with /amp/. 3. No. 4. Yes, they end with /ox/. 5. No.
Rhyme matching	1. What word rhymes with *plane*? 2. What word rhymes with *key*? 3. What word rhymes with *pan*? 4. What word rhymes with *sock*? 5. What word rhymes with *mouse*?	1. Train, rain 2. Bee, sea 3. Fan, can 4. Rock, block 5. House, louse
Initial sound deletion	1. Say "*cat.*" Now, without /c/, what's left is? 2. Say "*dice.*" Now, without /d/, what's left is? 3. Say "*deer.*" Now, without /d/, what's left is? 4. Say "*leg.*" Now, without /l/, what's left is? 5. Say "*boat.*" Now, without /b/, what's left is?	1. At 2. Ice 3. Ear 4. Egg 5. oat
Ending sound deletion	1. Say "*bike.*" Now, without /k/, what's left is? 2. Say "*bean.*" Now, without /n/, what's left is? 3. Say "*fork.*" Now, without /k/, what's left is? 4. Say "*sheep.*" Now, without /p/, what's left is? 5. Say "*boat.*" Now, without /t/, what's left is?	1. Bye 2. Bee 3. Four 4. She 5. Bow

Second, an extensive internet search was conducted with keywords such as "open-source games," "open-access products and covid-19" to identify free and easily accessible online tools to incorporate the PA activities. Based on search outcomes, researchers selected UNESCO's website (https://en.unesco.org/covid19/educationresponse/solutions) because it included ten free teaching tools for developing digital learning content. All ten tools were tried out by transferring one to two PA activities in a digital format. Researchers determined that the ThingLink tool (https://www.thinglink.com/) was the most suitable due to its teacher-friendly outlook and easy-to-use student operation. ThingLink is an education technology platform that enables teachers to turn any image into an interactive graphic that includes audio and visual stimuli to learners. Prior to developing any graphics, teachers may view the "how-to" video tutorial that provides an overview of ThingLink (https://www.thinglink.com/media/1307373128543895553). Diagram 1 below presents the steps for accessing the digital tool and creating an activity.
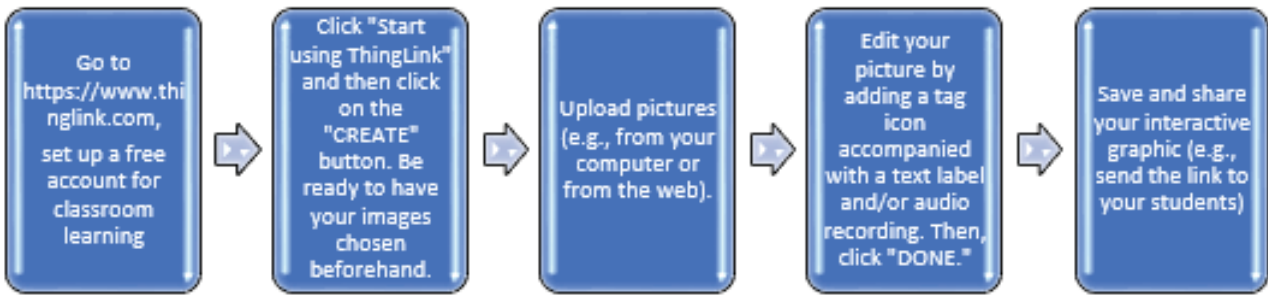
Diagram 1. Access and develop activities on the ThingLink tool.

The third step researchers took was to incorporate two PA activities on initial and final sound recognition into the ThingLink platform. After creating an account, team clicked on "Start using ThingLink," uploaded a colourful picture of a park (see Grapheme 1), and added a number of tags (e.g., circled crosses) on specific parts of the image.
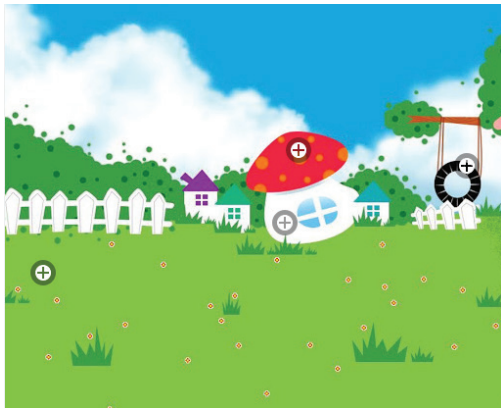
Grapheme 1. An interactive image with clickable circles of PA prompts.

Using ThingLink's interactive toolbar, researchers proceeded with editing the tags. Each annotated tag included audio-recorded teaching prompts (e.g., "What sound does '*mushroom*' begin with?") and a correct response ("Mushroom begins with /m/ sound. Listen 'mmmushroom'"). Student feedback was provided with a 5-second delay. Tables 2 and 3 show the PA teaching prompts and the correct responses recorded on the graphic.

Table 2
Initial phoneme recognition

Teaching Prompt	Corrective feedback
What sound does '*mushroom*' begin with?	Mushroom begins with /m/. Listen mmmushroom.
What sound does 'fence' begin with?	Fence begins with /f/. Listen fffence.
What sound does '*tyre*' start with?	Tyre begins with /t/. Listen tttyre.
What sound does '*grass*' start with?	Grass begins with /g/. Listen gggrass.
What sound does '*tree*' start with?	Tree begins with /t/. Listen tttree.

Table 3

Final phoneme recognition

Teaching Prompt	Corrective feedback
Say the last sound in '*grass.*'	Grass ends with /s/. Listen grasssss.
Say the last sound in '*flower.*'	Flower ends with /r/. Listen flowerrr.
Say the last sound in '*mushroom.*'	Mushroom ends with /m/. Listen mushroommm.
Say the last sound in '*roof.*'	Roof ends with /f/. Listen roofff.
Say the last sound in 'house.'	House ends with /s/. Listen housssse.

Fourth, researchers shared the graphic link of the PA activities with five experienced kindergarten teachers, who had worked with the team in previous professional development in-service teacher trainings. Researchers asked teachers to click on the link and complete all PA activities while assessing the feasibility and easiness of the interactive graphic. Subsequently, teachers were instructed to share the link with five families of kindergarten students (i.e., five years old). Students were asked to click on the teaching prompts and answer the questions carefully. Researchers asked for parental feedback and checked for student understanding, responsiveness, and interest via a semi-structured interview (see Appendix). Teacher, parent and student feedback are summarized below.

RESULTS

Using a brief interview checklist researchers obtained parental and teacher input of the ThingLink tool. Based on participants' feedback, the tool seems to be a promising instructional medium for strengthening student PA skills. Particularly, all teachers described the ThingLink tool as an enjoyable and interactive tool that enhanced student active responding and provided multiple practice opportunities. Students had the opportunity to respond to several instructional prompts and receive feedback. Despite the fact that kindergarten teachers had not been involved in the development process, they agreed that they could use the tool for designing and implementing a series of PA activities for young learners especially during future school closures. Teachers, also, shared that the number of questions asked per PA skill was small (i.e., 5). They suggested that in future graphic refinement, they would have preferred having more question prompts.

Parents observed that their children were actively engaged by clicking on the tags and trying to respond to questions as quickly as possible. They considered the 5-second response feedback very important as it strengthened student's understanding of correct responses. Parents shared that students were eager to identify the tags, click on them and respond to the verbal instructions. They did not observe any student hesitations or boredom and considered the number of questions sufficient. Furthermore, students when asked to choose which type of PA activity they would preferred working on their PA skills (digital or classroom), they were in favor of the interactive graphic.

IMPLICATIONS

A user-friendly digital tool was used to create two PA activities, aiming to help students develop their ability to discriminate initial and final sounds in words. Research team received informal positive feedback from a convenience sample of teachers, parents and students about the feasibility, effectiveness, and easiness of the digital activities.

Considering that the ThingLink tool is a simple instructionally designed tool with minimal in-service teacher training requirements, it is feasible for teachers to use this tool to teach in a conspicuous manner a sequence of PA skills varying in difficulty and complexity. Some PA skills tap simple, shallow-level PA; others are indicative of complex, deep-level PA (Justice & Schuele, 2004). For example, identifying and generating rhymes are considered simple PA tasks, while deleting and manipulating individual word sounds are considered as complex PA tasks. However, both simple and complex PA skills appear to represent a unified single construct (Anthony & Lonigan, 2004; Papadopoulos, Kendeou, & Spanoudis, 2012), which plays a significant role in reading development (e.g., Parrila et al., 2004).

Teachers may use the ThingLink tool to design and implement a series of PA activities, tapping both simple and complex PA. The following activities can be carried out: In the first activity, teachers may upload an image (e.g., moon) and place multiple buttons on specific parts of the image that students can click and determine whether word pairs rhyme

(e.g., Do 'moon' and 'spoon' rhyme?; see Muter, Hulme, Snowling, & Taylor, 1997). Corrective feedback will be delivered with a 5-second delay (e.g., "Moon and spoon rhyme because they have the same ending sound /oon/."). In the second activity, children can be asked to carefully listen to each prompt message and produce words that rhyme with the target word (e.g., What rhymes with 'plane'? Remember the new word has to end the same way as in 'plane'; see also Muter et al., 1997). A correct response with two rhyming words will be given (e.g., train, rain). In the third activity, students will be asked to repeat the prompt messages and then say what the word would be if the initial sound were deleted (Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993). For example, student instructions could include "Name the picture 'cat.' Now, without /k/, what's left is?" Student corrective feedback will be given again with a 5-second response delay. The fourth activity could focus on final sound recognition (e.g., "Say 'bike.' Now, without /k/, what's left is?").

Further replication steps could target letter knowledge. One example could be students clicking on the tag that has the letter A, then identifying its sound and name and watching a video demonstrating the targeted letter writing. Such a skill has been found to be strong predictors of reading ability (e.g., Leppänen, Aunola, Niemi, & Nurmi, 2008).

FUTURE RESEARCH

Moving into a more carefully planned research examination of the effectiveness of the ThingLink tool with the PA activities, research team would focus on a randomized group experimental design with one control group that will work on 'business-as-usual' literacy activities and the experimental group that will participate in ThingLink PA sessions. The focus is to implement the experimental protocol for one year and then follow up both groups over the next two years assessing their PA and decoding skills. Previous research demonstrated that explicit PA instruction produced the strongest growth in reading skills for students in subsequent school years (Hatcher et al., 2004). Incorporating explicit PA activities with immediate corrective feedback into the interactive graphic seems to produce positive results in students' reading abilities.

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APPENDIX

Exit Interview Guide

	Questions for Teachers
1.	What aspects of the tool did you like the most? (e.g., easiness, functionality, outlook)
2.	What aspects of the tool did you consider difficult for students? (e.g., easiness, functionality, outlook)
3.	What suggestions do you have for improving the tool?
4.	Would you be interested in including such tool in your instructions?

	Questions for Parents
1.	What aspects of the tool did your child like the most?
2.	What aspects of the tool did your child find difficult?
3.	What suggestions do you have for improving the tool?
4.	Which activity does your child prefer when working on his PA skills: practicing with the tool or responding to teacher PA questions?

In-service Teachers' Technology Integration for Young Learners: Using QR Codes to Extend Knowledge Building with Non-fiction Picture Books

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Background knowledge is a key construct to reading comprehension, and Wexler (2020) argues that building that knowledge is a missing piece in comprehension instruction. Embedding QR codes, linked to rich, multimodal, and diverse web-based resources, within high quality non-fiction trade books can expand young children's knowledge networks and offer parents direction for extending the learning at home with high quality resources safe for young learners' easy navigation. Based on a study in progress involving 200 teachers in the Mid-South, we explain how we can train teachers to utilize QR codes to deepen text content, their own content knowledge, and thus guide students into a knowledge building interactive read aloud experience. While not created in response to the current pandemic, like many things, this strategy has been quickly and easily adapted as it well-suited to asynchronous, distance learning, making it uniquely relevant to today's educators.

INTRODUCTION

In her book, *The Knowledge Gap*, Natalie Wexler (2020) advocates centering literacy instruction around engaging, rigorous content knowledge rather than a vacuum of isolated reading skills and offers knowledge building as the missing component to reading comprehension instruction. Without background knowledge, even skilled readers labor to make sense of a topic (Recht & Leslie, 1988).

A shift in the Common Core standards focuses on "*building knowledge* through content rich non-fiction," indicating teachers should choose non-fiction texts to read with students at least 50% of the time (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Strong content preparation for teachers results in more frequent integration into their teaching and stronger student outcomes (National Research Council, 2001).

Recently, local districts asked teachers to expand their use of non-fiction texts in the classroom in a push for knowledge building curriculums. Thus, the purpose of the professional development (PD) was to provide in-service teachers with high-quality non-fiction texts and a strategy to implement immediately in their classrooms. Following a teacher PD cycle (Souza et al, 2015), facilitators led a workshop. Originally, the PD was planned for asynchronous and blended learning, but with the interruption of COVID-19, it became relevant and applicable to remote learning as teachers were asked to use this strategy in online instruction.

In this work, we describe a PD model that will expand teachers' ability to build networks of layered content knowledge by integrating multimodal web-based resources within children's non-fiction picture books and offer tips to adapt the PD to virtual delivery.

INNOVATION

Prior to the pandemic, researchers conducted two PD trainings supporting 200 teachers as they learned about embedding QR Codes within texts for knowledge building. While not intended to support distance learning, this strategy has since proven useful for remote learning as teachers expand their limited resources by curating picture books embedded with QR codes.

The objective was for teachers to leave with the skills and tools necessary to create webs of connected learning using the non-fiction books as anchors, with embedded QR codes for extended knowledge. QR codes allow teachers to link websites, podcasts, photos, songs, texts, and social media with associated content to extend background knowledge; moreover, they are particularly well-suited to how young children interact with technology, eliminating issues that may disrupt direct navigation. A smart device is then used to read the QR code linking directly to the extended information.

This two-hour PD featured key elements of highly effective PD, including modeling effective strategies, practice, opportunities for immediate classroom use, and peer collaboration (Ball & Forzani, 2009; Butler et al, 2004). PD began with a guided model using the following example. See Table 1 for step-by-step directions for implementation and additional tips to recreate this experience in a virtual environment.

Using the 5th grade social studies standards centered on the cultural and economic developments during World War I, the book *Finding Winnie* by Lindsay Mattick was chosen. The book is set in 1914 and details the story of a veterinarian who rescued a baby bear on his way to tend horses during WWI. A significant knowledge building moment comes when the author states, "One was a hospital for horses, where Harry went to work" (p. 17-18). The embedded QR code links to the National Army Museum website, where students find a section dedicated to Army horse care during the first World War (see Figure 1). The website offers primary source documents, visuals, and artifacts to foster background knowledge and related vocabulary. During the reading of the book, the facilitators modeled how to choose stopping places and powerful resources. Three more QR codes were placed in this book, including a map of Army base locations, videos of the cartoon Winnie the Pooh, and the present-day London Zoo website. Each link is intended to help students construct webs of connected knowledge in a safely curated and integrated format. During this portion of the PD, the facilitators modeled their thinking process, *"I wonder what a hospital for horses was? I want to know more."*
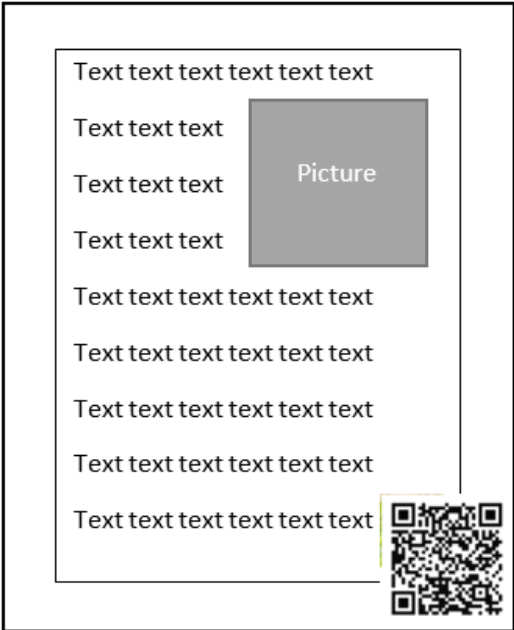

Figure 1. Example of QR code placement in a book.

After the model lesson, teachers were placed in small groups for collaborative active learning, an essential part of effective PD that has participants model their recently acquired knowledge and skills (Ball & Forzani, 2009; Desimone, 2009). In this case, each group was given texts that matched their grade level and content interests.

The facilitators guided teachers in a step-by-step process for reading the book and making decisions for opportune stopping places. The first time, participants read the book for enjoyment and understanding. In the second read, teachers were encouraged to search for keywords, marking places of considerable importance to knowledge building. Facilitators asked the groups: *What is the key content you want students to understand? Are there any other ways this content can be presented? Is there a video or photo you could link that might help clarify the meaning? Consider the setting and related music, culture, maps, or photos that would bring the setting to life?* In the third read, facilitators encouraged teachers to consider multiple perspectives and differing viewpoints. *Ask yourself the question, is anything being left out of this text that I want my students to know? Is there another perspective to demonstrate?* Lastly, consider current events and updated information. *Is there a current event that could help students build knowledge and perspective in the content? Is there new scientific information that that would build current knowledge of a subject?* To end the session, facilitators led a share time.

RESULTS

Participating teachers offered feedback through social validity reports during the PD and progress reports after returning to their school. Initial findings suggest that teachers found the training and practice to be useful in the following four areas.

Knowledge Building and State Standards

Teachers reported that planning for the interactive read aloud with QR codes allowed richer understandings of their own standards and content. One teacher reported deepening her own network of knowledge when searching for links for a picture book titled, *A Storm Called Katrina* (Uhlberg & Bootman, 2011). She gained greater insight into the experiences of people during Hurricane Katrina, finding links to the Superdome and Louis Armstrong's music to share with her 3rd grade students. Expanding a teacher's own knowledge of the world strengthens classroom instruction which in turn supports students in gaining greater knowledge (Wexler, 2020).

Support for Pacing and Deep Learning

Teachers reported that the pre-planned QR codes helped them with pacing lessons, allowing time to stop and process important parts of the text. The QR codes also gave teachers reasons to return to complex topics to unearth deeper layers of meaning within that topic – a hallmark of close reading (Fisher & Frey, 2015).

Inexpensive, Versatile, and Easy

While the study in progress focuses on elementary school, this strategy can work with any grade level using materials teachers already own. This can be implemented tomorrow in traditional or online learning environments with any text.

Knowledge Breeding More Knowledge

These networks of learning have increased curiosity for teachers and children alike. Several teachers reported casually searching on their phones, looking up multimodal supplements for classroom reading in their spare time. Teachers' beliefs relative to new practices are essential for the success of PD (Datnow et al., 2006) and offering up personal time to pursue these topics demonstrates interest in the practice. This extended to students as one child came to school with a QR code idea of her own. She heard the theme song for Winnie the Pooh at her house and came to school saying the teacher should "put it in the Finding Winnie book."

IMPLICATIONS

In this unprecedented time of remote learning, this PD can support teachers in implementing engaging lessons that offer easy access for young learners. Facilitators may find it easy to establish buy-in with teachers who have been thrust

in online learning environments. For teachers looking for quick knowledge extensions on a class book, facilitators can quickly model (less than 30 min) how to transform an online read-aloud (e.g., livestream) into a digitally engaged background building experience by sending a set of QR codes so students can explore the concepts of the text more deeply. For teachers looking to build a more extensive unit of study, perhaps in planning for uncertainty in the Fall, facilitators could plan to provide the full two-hour PD experience (see Table 1). In this scenario, teacher teams work together to plan units and determine the best sources for expanding the networks of learning associated with the unit's key texts.

Table 1
Steps for recreating the 2-hour PD and tips for implementing virtually

Action Step	Details
Identify social studies or science content standards	Consider the audience you will be serving. What grade level do they teach? Consider using survey data or testing data to identify content areas and specific standards that need support. Choose 2-3 content standards to address for your model lesson.
Identify notable non-fiction picture books that align with the standards	Check non-fiction book award lists such as Orbis Pictus Award, Siebert Informational Book Medal, and/or NSTA's Outstanding Science Trade books. Teachers (and families) that have local library cards can use the Libby app which offers free print and audiobooks on loan. During COVID-19 free eBooks are available from Scholastic Learn at Home and getepic.com.
Strategically choose opportune placements for knowledge building within the text	Read through the book multiple times. The first time, read the book for enjoyment and understanding. The second read, search for keywords within the content, marking places of considerable importance to knowledge building. What is the key content you want students to understand? Are there any other ways this content can be presented? Is there a video or photo you could link that might help clarify the meaning? Consider the setting and time period. Are there any links of music, culture, maps, or photos that would bring to life the setting? In the third read, consider multiple perspectives and differing viewpoints. Ask yourself the question, is anything being left out of this text that I want my students to know? Is there another perspective to demonstrate? Lastly, consider current events and updated information. Is there a current event taking place now that could help students build knowledge and perspective in the content? Is there new scientific information that has recently come to light that would build current knowledge of a subject? Consider what primary resources might support this text. (Free primary source sets for several topics can be found here: https://library.mtsu.edu/tps/sets) Consider multi-genre, multimodal content (e.g., podcasts, videos, photographs, articles, maps, websites) and differing perspectives. Kiddle.co is a great kid-friendly search engine used to find child appropriate photographs and articles. *Wow in the World* and *Smash Boom Best* are two engaging kid-friendly podcasts.
Create the QR Codes	Use a QR Code generator to create 3-4 codes per book such as https://www.qr-code-generator.com/ For remote teaching, create one page of QR codes to post share with parents after a remote read aloud. Under each QR code, place the page number in which the student should pause and scan. Other options can include printing and taping the code inside a hard copy of the book or copying and pasting onto the Kindle version of the text in a PowerPoint.
Model two texts for your audience	Model steps 1-4 in front of the teachers. What standards did you choose? How did you choose them? What books did you choose to match? Read the book aloud to the teachers, stopping at the QR codes and pulling up the songs, primary resources, photos, and videos live in front of the teachers on a shared screen.

Action Step	Details
Provide texts or have teachers bring their own texts for immediate guided practice	Teachers should work together in grade level groups of approximately 3 to practice strategically choosing opportune placements for knowledge building within the text. Facilitators will circle around prompting groups and asking the questions from step 3 of this table, guiding them in effective practice of the strategy and answering questions. Teachers should mark the places they would like to add a QR with a sticky note. Using a smart device or computer, the teachers can begin searching for effective multimodal resources to add within the text.
Share	Allow each group to share with the whole group. The share should include a short book talk and descriptions of 3-4 QR codes within the text.
How to create a QR Code	End the session by modeling how to turn the resources into QR codes. The facilitator should show how one can go from a website to the QR code generator in real time on a projected screen.,
Making it Virtual	This can easily be transformed to an online delivery through a virtual platform such as Zoom. The facilitators would still model the strategy by using an eBook version of the text and sharing the screen with the participants. Breakout rooms with varied eBook options can be used for the collaboration and planning portion of the PD.

FUTURE RESEARCH

Future research will be implemented in Fall 2020 with pre-service teachers to address calls to further support the development of teacher knowledge in order to teach a range of subject areas and grade levels (e.g., Tambyah, 2008). Pre-service teachers from a reading methods course will use the strategy described here with a group of children in an elementary school. The experiences and content knowledge of the pre-service teachers will be measured to understand the effectiveness of the strategy.

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Making Effective Use of Voice Thread and Discussion Boards in Online Coursework

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This paper explains how two-college faculty who teach pre-service teachers' (PSTs) educational technology course utilized Voice Thread (VT) as their class transitioned online as a result of COVID-19 school closure. The VT presentations were augmented by the use of threaded Discussion Board comments. We found that VT promoted active learning and students' interest. It also helped to connect students thereby enhancing classroom community. However, we found that combining it with threaded discussions deepened PSTs' learning as the quality and quantity of students' comments on the discussion board exceeded that of face-to-face comments. We suggest using VT for online and hybrid learning but extending its affordances with threaded discussion.

INTRODUCTION

We teach an undergraduate face-to-face Educational Technology course in which one of the major assignments is the presentation of an app or program used in the classroom (e.g. Prodigy, Kahoot, Splashlearn, NewsELA, and so on). Due to Covid-19, this class was moved online. We chose Voice Thread (VT) to enable our pre-service teachers (PSTs) to present their work. Voice Thread (VT) is a collaborative, cloud-based tool that allows users to share content including videos, audio files, presentations and images (Delmas, 2017). VT increases engagement, online community, and success for all types of learners (Brunvand & Byrd, 2011; Salas & Moller, 2015). The affordances of VT include multimodality, collaboration, interactivity, and connectivity (Beach and O'Brien, 2015). To spur thoughtful discussion from the VT presentations, we linked the presentations to a discussion board for better peer interaction and reflective thinking (Cho & Tobias, 2016; Calderon & Sood, 2020).

As PSTs learn how to use technological tools, it is important to link the tools to a technology model or framework such as SAMR (Kimmons & Cassidy, 2018). The substitution, augmentation, modification, and redefinition (SAMR) model is a taxonomy-based approach for selecting, using, and evaluating technology (Hamilton, Rosenberg, & Akcaoglu, 2016; Puentedura, 2006). SAMR helps PSTs consider and make good technology decisions. Teachers should strive toward activities that lie at the modification and redefinition levels of the SAMR to meet the goal of transforming learning (Romrell, Kidder, & Wood, 2014).

INNOVATION

At the start of the semester, the app presentation assignment included a detailed PowerPoint template for the content to be reviewed, a model presentation given by the professor, and a grading rubric that assesses materials. The rubric includes the app review content, technology use, and presentation skills. Once we moved to online instruction, we considered what to adapt for the remainder of the semester and how to facilitate the experience of presenting apps, viewing app presentations, and giving and receiving feedback. Voice Thread provided all these functionalities.

We provided the students with a PowerPoint template for their own presentation, a grading rubric, and a VT presentation that served as a model. Because the class went online, we decided to review the grading rubric. We agreed that the Materials, App Review - Content, and Presentation evaluation would remain the same. The Technology Use evaluation would change from the expected face-to-face classroom use - which included using a Redcat microphone and two projectors with multiple input options - to the creation of VT. The remaining parts of the Technology Use parameter

- managing technology with a calm and poised attitude and making adjustments as needed were evaluated with slight modification for students who presented with VT.

We posted a tutorial video for creating a VT provided by our Educational Technology team, a sample VT created by one author, and a link for creating and submitting a VT: https://www.youtube.com/watch?v=L3NII3fwbYo . The sample VT (see Appendix for PowerPoint template for app presentation) was already available to students, and the PowerPoint template had been reviewed in detail early in the semester. This familiar content was uploaded into VT, and we narrated each slide with details about using VT and tips for narration, pacing, and sharing the content with the class.

Students created VTs and to ensure equitable viewing, we assigned students to specific VT for viewing and commenting. Comments using the multimodal features of VT were required, but they were not graded because we wanted more detailed comments on the discussion board. The format for Blackboard comments was structured with explicit connection to ISTE standards and app content, and we created a very simple two-line rubric to grade the discussion (see Discussion Board Directions in the Appendix).

RESULTS

We were pleased that students adopted the use of VT with few obvious difficulties, and students' narrations were polished and poised. VT created high interest among students, an engaged online community, and peer presence (Brunvand & Byrd, 2011; Delmas, 2017) as students posted VTs, viewed them, made comments, and then wrote a detailed comment on the discussion board. Taking a cue from the work of Beach and O'Brien (2015), we maximized VT's interactivity and connectivity to build a collaborative community where PSTs responded to peers' presentations. Student participation was robust, and we believe that was related to a clear, defined prompt for discussing what they learned from the VT presentations.

The use of VT and threaded discussions fit within the modification level of the SAMR model, generally regarded as the level at which technology transforms learning in significant ways. The quality and quantity of comments on the discussion board exceeded the general comments from the face-to-face class. In addition, the discussion boards deepened PSTs learning because it promoted peer interaction, reflective and critical thinking as well as self-regulation (Cho & Tobias, 2016; Calderon & Sood, 2020). That may be because the asynchronous written comments were prepared carefully and with time to consider phrasing and the permanence of the comments, as opposed to casual spoken comments that were more off-the-cuff in class. Finally, students indicated that they liked the time and place flexibility and convenience that VT provided as a learning tool.

IMPLICATIONS

Our work with Voice Thread (VT) has implications for PSTs, teacher educators, and in-service teachers' professional development. Teacher preparatory programs should prepare pre-service teachers for online teaching and learning using VT. The tool has a minimal learning curve and is easy to use (Salas & Moller, 2015). Besides, the tool can be used to increase engagement, online community, and success for all types of learners (Brunvand & Byrd, 2011; Delmas, 2017). When courses are fully online, preservice teachers (PSTs) could use the VT video tool to create an introduction so that everybody will recognize and get to know each other. The variety of ways students introduce themselves can create interest and excitement about the online class community.

Teacher educators should provide clear instructions and rubrics (see Appendix A and Appendix B) and videos about the use of VT. Tell PSTs that slides should not be overcrowded and presentations should look professional with good phrasing and intonation. Add questions to some slides and mandate that students respond to the questions using video, audio, or text comment features of VT. This is how you can promote engaged learning with the tool. Use the VT tool for micro lectures (Dawn, 2014). Microlectures are 10-15 minute presentations on a single topic. The advantage is that it is short, and focuses on a single idea or topic, which increases comprehension. Furthermore, teacher educators can use VT to facilitate flexible learning. Flexible learning means "offering choices in the educational environment, as well as customizing a given course to meet the needs of individual learners" (Huang, Liu, Tlili, Yang, Wang et al. 2020, p. 2). Teacher educators can use VT, as we did, to adjust to an online modality. VT can also be used in face-to face and hybrid courses as one option for presenting, or as a required presentation format. In the case of hybrid course designs or flipped

classroom models, instructors can encourage students to present their work with VT, and then use face-to-face time to reflect on the presentations. Student groups can work to evaluate the tool using the SAMR model to assess and determine the level of technology utilization that it represents. For example, VT and discussion boards combined are examples of modification and redefinition levels. This means they allow for significant task redesigns and their functionalities cannot be replicated in a traditional classroom.

Teacher educators should extend the opportunity for multimodal comments on VT with threaded discussions. Although VT's multimodal features allow for comments, students typically do not make robust comments using those tools. Threaded discussion can help to deepen discussions, promote deeper and better peer interaction, reflective and critical thinking (Cho & Tobias, 2016; Calderon & Sood, 2020).

Finally, K-12 in-service teachers should use VT for blended or online learning to deliver recorded lectures for their students especially those in upper elementary grades and beyond. Teachers can add questions to the presentation to spur critical thinking and student engagement.

FUTURE RESEARCH

Voice Thread is a very useful tool for teaching and learning. Therefore, more research should be conducted on various ways that VT can support students' learning. For example, what are PSTs' perceptions about using PowerPoint for face-to-face presentation versus doing the same presentation using voice thread? Another area for future research is how Voice Thread might support teacher candidates' agency or their ability to influence their learning. In addition, research can examine the quality and quantity of students' comments on voice thread. Do VT presenters receive quality feedback from the multimodal tools of VT? Finally, research can be directed to ways that discussion boards can be used to extend the conversations around students' presentations on VT, or extend the work on how VT builds community (Brunvand & Byrd, 2011; Delmas, 2017).

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APP PRESENTATION RUBRIC (MODIFY AS NEEDED)

	Exemplary	Proficient	Developing	Not Yet Acceptable
Materials	The content is clear and to the point. Appealing graphic elements are included. Differences in type size and/or color are used well. Hyperlinks are included. Content contains no typographical errors.	The content is clear and to the point. Differences in type size and/or color are used well. Content contains no typographical errors. Presentation is loaded correctly, and viewers can see slides and hear narration.	The content is present. Content may be busy or may be difficult to review because too much content is presented at one time. Content contains some typographical errors. Presentation is loaded. There may be issues will all viewers accessing both slides and narration.	The content is not present or is not complete. Content may be busy or may be difficult to review because too much content is presented at once. Content is plain with no variation in size and/or color. Content contains many errors. Presentation is not loaded. Viewers are not able to see presentation or hear narration.
App Review - Content	The app review is clear and detailed. All questions on template PowerPoint are addressed. Six or more slides are included.	The app review is clear. All questions on template PowerPoint are addressed. Six or more slides are included.	The app review includes responses to most questions from template PowerPoint. One or more slides are missing.	The app review does not address questions from the template PowerPoint. Multiple slides are missing.
Technology Use for face-to-face	Multiple resources are used skillfully (examples: Smartboard, Brightlink doc cam, projectors, redcat, powerpoint). Presenter manages technology with calm and poised attitude. Presenter makes adjustments as needed.	Multiple resources are used (examples: Smartboard, Brightlink doc cam, projectors, redcat, powerpoint). Presenter manages technology with calm attitude.	Two or three resources are used skillfully (examples: Smartboard, Brightlink doc cam, projectors, redcat, powerpoint). Pre	Two or three resources are used (examples: Smartboard, Brightlink doc cam, projectors, redcat, powerpoint). Presenter does not manage technology with calm attitude.
Technology use for VT	Slides are very well presented, and slide transition is very good.	Slides are presented well, and slide transition is good.	Slides are presented. Slide transition is not good.	Slides are not presented well. Transition is not good.
Presentation	Presentation is poised and clear; narration flows smoothly. Narration reviews slide content and adds new information. Minimal use of "um," "er" or other fillers. Pacing is good.	Narration is poised and clear; narration flows smoothly. Narration reviews slide content and adds new information. Some use of "um," "er" or other fillers. Pacing is good. Some narration may be rushed or run on longer than necessary.	Narration may be choppy or disjointed. Narration reviews slide content. Frequent use of "um," "er" or other fillers. Pacing is good. Some narration may be rushed or run on longer than necessary.	Narration may be choppy or disjointed. Narration reviews slide content for some slides. Frequent use of "um," "er" or other fillers. Pacing may be choppy. Some narration may be rushed or run on longer than necessary.

DISCUSSION BOARD DIRECTIONS

Kudos to those who made Voice Threads! You developed your Technological Knowledge (TK) in the process. Nice work preparing and posting your app presentations.

In this Discussion Board, you will make comments on three Voice Threads. Two are assigned - see the chart below. You choose the third.

You are graded on your knowledge of ISTE standards and the app and will consider how the app connects to use in the classroom– see the grading rubric and comment prompts:

	Exemplary	Proficient	Developing	Not Yet Acceptable
Comments: ISTE Knowledge	Comments demonstrate thorough understanding of ISTE standards.	Comments demonstrate understanding of ISTE standards.	Comments demonstrate little understanding of ISTE standards.	Comments demonstrate limited or no understanding of ISTE standards.
Comments: App Content	Comments demonstrate thorough understanding of app.	Comments demonstrate understanding of app.	Comments demonstrate little understanding of app.	Comments demonstrate limited or no understanding of app.

In your comment:

- Make one connection to ISTE-E or ISTE-S standards.
- Give a specific strength of the presentation related to the app and how the app works. Add a connection to your own experience; how you have seen the app used, or how you might use it when you are a teacher.

Your name	Watch and comment	Watch and comment
[names redacted]	Padlet	Mosa Mack Science
	Notability	Zearn
	Photomath	Splashlearn
	Mosa Mack Science	Socrative
	Zearn	Nearpod
	Splashlearn	Great Courses Plus
	Socrative	Happy Numbers
	Nearpod	BrainPop Jr.
	Great Courses Plus	Raz-Kids
	Happy Numbers	NewsELA
	BrainPop Jr.	BrainPop
	Raz-Kids	Schoology
	NewsELA	Splashlearn
	BrainPop	Padlet
	Schoology	Notability
	Padlet	Photomath
	Notability	Mosa Mack Science

Asynchronous Audio Feedback: Time- and Space-flexible Writing Instruction

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Recently, two multiple-probe across participant design studies of practice-based professional development to support teacher-implemented asynchronous audio feedback with upper elementary and middle school students demonstrated improved performance across number of revision moves and overall writing quality. Asynchronous audio feedback is a strategy teachers can use to provide detailed, differentiated feedback on student writing and has been found to support and improve students' writing performance. The strategy offers flexibility of implementation and is easily delivered with a variety of readily available technology tools. Following the studies, both teachers and students reported high social validity citing more individualized feedback, self-determined pace, and issues of privacy. The objective of this chapter is to share the details of PD experiences with this strategy as well as suggestions for virtual delivery to support other PD providers in differentiating instruction to meet the needs of teachers, students, and families in this unique time of online learning.

Keywords: practice-based professional development, writing instruction, feedback, writing conference, revision, in-service teachers, differentiation

INTRODUCTION

In recent weeks, former students and in-service teachers have reached out for strategies to support writing instruction in this era of sudden distance education. A recurrent recommendation has been asynchronous audio feedback.

Even in typical times, many demands limit teachers' ability to hold individualized face-to-face writing conferences with students (McKeown et al., 2014) and current social distancing orders preclude them altogether. However, when teachers provide high quality, timely feedback, student writing outcomes improve (Graham et al., 2012). Moreover, teachers are often unsure of what elements to focus on and comment upon surface-level features such as spelling or punctuation rather than more substantive revisions likely to improve overall quality (Matsumara et al., 2002).

Another option is to provide individualized support through asynchronous audio feedback – a strategy that is easily converted to distance instruction. Recording audio feedback in response to student writing allows teachers to offer more detailed feedback more efficiently through tablets and computers using various free or low-cost options. The practice has been used in university settings with most students reporting a preference for audio feedback citing more detailed advice and a greater degree of instructor investment (e.g., Bilbro et al., 2013).

Two recent studies extended these findings by providing professional development (PD) to support in-service teachers in using asynchronous audio feedback to improve the writing performance of upper elementary and middle school students (McKeown et al., 2015; 2020). The objective of this chapter is to share the details of PD experiences with this strategy as well as suggestions for virtual delivery to support other PD providers in differentiating instruction to meet the needs of teachers, students, and families in this unique time of online learning.

INNOVATION

In these two concurrent multiple probe across participants design studies (Horner & Baer, 1978), teachers received PD in using asynchronous audio feedback to improve student revising and overall writing quality with upper elementary and middle school students (McKeown et al., 2015; 2020). The research team provided ten hours of practice-based PD (Ball & Cohen, 1999; Harris et al., 2012). Practice-based PD utilizes dynamic interactions between the facilitators and participants, engaging in real-time practice with immediate feedback.

Trainers began with an overview and review of scientific support for the strategy, the evidence base for writing instruction, and how asynchronous audio feedback aligns with those findings. Facilitators inquired about common writing assessments and introduced a variety of assessment options (rubrics, checklists, holistic scores using anchor papers) that fit with asynchronous audio feedback. See Table 1 for a detailed schedule of events for PD.

Table 1
Professional Development for Asynchronous Audio Feedback

Introduction to asynchronous audio feedback training

- Agenda and establishment of safe environment for learning
- Self-Introductions

iPad Intervention

- Overview
- Why this intervention?

Overview of evidence-based writing instruction

- Defining evidence-based interventions
- Academic writing genres (narrative, persuasive, informational)
- 6 Stages of Self-regulated Strategy Development for writing

Discuss Lessons

- Lesson Overviews
- Handouts/Materials

Scoring Writing

- Assessment for learning
- Feedback and scoring
- Rubrics, checklists, holistic scores (anchor papers), genre elements

Model Lesson 1

- Trainer models
- Teacher conducts lesson supported by fidelity checklist with feedback from trainer

Model Lesson 2

- Trainer models
- Teacher conducts lesson supported by fidelity checklist with feedback from trainer

Independent Practice

- Teacher practices giving audio feedback on sample essay, using app and checklist
- Trainer offers feedback
- Teacher practices giving audio feedback on sample essay, incorporating feedback

Plan for Application

- Teacher chooses writing projects for audio feedback
- Schedule time on planning calendar for pretesting and instructional lessons
- Evaluate applicable assessment tools (e.g., rubrics) for the projects to guide feedback

After establishing the evidence base for the work and consistent with practice-based PD principles, trainers explicitly modeled each lesson as it would be done with children. See Appendix A for a detailed explanation of each lesson.

In the initial lesson, the trainer conducted an explicit model of the entire process of using asynchronous audio feedback including a review of writing, revising, and essential elements of the genre. The trainer then modeled revising a draft using pre-recorded audio feedback and made revisions to the draft as directed. Throughout the process, the trainer incorporated self-statements for task definition (e.g., *What have I been asked to do?*), coping (e.g., *This is a challenge, but I'll take it step by step.*), perseverance (e.g., *I've made progress; I can make a little more.*) and celebrations (e.g., *I'm almost done!*). The trainer then modeled rewriting the essay incorporating all revisions. This step would be unnecessary if students were typing essays rather than handwriting.

Participating teachers performed the lesson with peers serving as students while using the fidelity checklist as a scaffold for consistent implementation. See Appendix B for an example teacher fidelity checklist. The PD continued with a collaborative model of the strategy with a gradual release of responsibility to students. This includes a series of six practice lessons wherein students engage with revisions of their work with the support of the teacher's pre-recorded feedback.

By the end of PD, teachers recorded themselves as they read an exemplar essay aloud using Notability, an iPad app (cost $11.99) to host the audio feedback. They paused after each section of the checklist (e.g., first reason). For example, once the teacher read the first reason in the essay, the teacher would then provide feedback on the two related questions on that portion of the checklist. "*Did you state your first reason? Did you give an explanation or example for your first reason?*" If the feedback was more than praise, such as a suggestion for improvement, the teacher would record feedback to pause the audio, address the revisions, and then return to the feedback. After the teacher worked through each component on the checklist, the teacher recorded themselves directing students to create final drafts, incorporating the revisions made. Participating teachers were expected to successfully instruct each lesson including all steps on the fidelity checklist. Trainers provided feedback to improve implementation throughout the process.

Following PD and after implementing evidence-based genre-focused writing instruction (e.g., self-regulated strategy development; Harris, 2008), teachers assigned prompt-based writing assignments and implemented the lessons learned in PD with their own students. Teacher feedback took an average of six min for each essay. During intervention, a member of the research team observed fidelity and provided written feedback after each session. The feedback to teachers included a summary of the lesson, highlighted strong practices, and offered recommendations for improvement.

RESULTS

Teachers implemented the intervention with high fidelity ($\geq 85\%$) following PD. Via interviews and social validity surveys, teachers and students reported satisfaction with the depth and privacy of the practice. Teachers and students reported enjoying and benefiting from the individualized, detailed feedback; teachers also noted heightened engagement, attributing that to embedded technology. Additionally, all participating teachers reported that the asynchronous delivery allowed for more flexibility in time and space.

Following PD and implementation, the number of revisions student made increased, and overall, writing quality improved. In one study, the number of persuasive elements included in the initial drafts increased from 4.02 in baseline to 7.17 post-intervention (McKeown et al., 2020); that is, following intervention, not only did revisions increase when students were asked to revise, but the overall quality of writing improved even *before* students were asked to revise. The researchers hypothesize this success was supported by the trained teachers' consistent reinforcement of the genre requirements embedded in the feedback process through use of a structured checklist.

IMPLICATIONS

Asynchronous audio feedback is a low-cost method of conferring that offers time flexibility, essential for online instruction. See Table 2 for a variety of free technology options for implementation. These studies provide evidence that in-service teachers can be supported to effectively use asynchronous audio feedback to support improved student writing performance with approximately ten hours of practice-based PD (McKeown et al., 2015; 2020).

Table 2
Free tools for Asynchronous Audio Feedback

Technology	Mark-up tools	Input	Output
Edu-Creations* Screencapture app w/ voice recording	Yes	Take pic or import pdf	iPad app, export video file
Kaizena Web-based, create or use built-in feedback (including instructional videos); Can place audio/video feedback at specific locations on the document	Yes	Students submit doc or pdf online	View in app only
Smartphone + email Written feedback could be provided on original essay	No	Record audio using built-in app	Email audio file
PDF markup app + audio recording app* Must manage pdf files separately from audio files; Some pdf markup apps have a cost	Yes	Import pdf Audio recorded on audio recording app	Email marked up pdf file + audio

*No internet needed except to export/import or email, if desired

The authors hypothesize the PD environment can be replicated fully online so long as the number of participants allows for all to engage in the full practice of each lesson (Wijekumar et al., 2018). Use of breakout rooms such as those available through WebEx or Zoom could easily facilitate one-on-one modeling between teachers with ongoing feedback from trainers who have the option to visit multiple rooms (Wijekumar et al., 2020). Moreover, coaches and trainers can provide ongoing feedback remotely as well. If a teacher is "trying out" feedback, they could send the audio recorded feedback to the facilitator for review prior to sharing it with students. The facilitator can send back strengths and areas for improvement. See Table 1 for further adaptations for remote learning.

PD providers interested in supporting in-service teachers as they learn to utilize asynchronous audio feedback would begin by helping teachers identify a target project requiring more intensive feedback as well as an associated rubric or checklist to guide the feedback (McKeown et al., 2015; 2020). Then, consider the free or low-cost tools that best match with local technology to support the process.

By introducing teachers to strategies that offer flexibility in recording and delivering feedback, professors and PD providers support all parties involved – teachers, parents, and students –as they are served by the explicit, structured, asynchronous nature of the feedback (Redmond & Lock, 2006). This meets the needs of in-service teachers with packed remote learning schedules, as well as students and families juggling shared devices and the stresses caused by this sudden shift in schooling and home life.

FUTURE RESEARCH

In the future, researchers should explore the effectiveness of online PD or just-in-time training to support teachers interested in learning how to use asynchronous audio feedback. Additional research should explore long term outcomes as well as maintenance for both teacher sustainability of the practice and student results. Generalization to other writing tasks is also an area ripe for exploration. The use of asynchronous audio feedback has been used with university students (Bilbro et al., 2013; Cann, 2014; Sipple, 2007) as well as upper elementary and middle school students (McKeown et al., 2015; 2020); further investigation into its generalization across grades, ages, and educational settings is warranted. This intervention also needs to be tested with larger samples sizes and varying writing genres, to determine how teachers can best adapt and differentiate the intervention to meet student needs.

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APPENDIX A

Asynchronous Audio Feedback Lessons

Model Lesson 1	
Overview	Teacher will model the entire audio-feedback process with the students.
Teaching Points	Teachers discuss: • What does it mean to persuade/inform/entertain? • Hallmarks of good persuasive/expository/narrative writing. • Importance of the writing process. • Usefulness of revising. • The differences between revising and editing.
Model	Students observed the teacher revising a draft using audio-feedback • Teacher listens to audio feedback (aloud, so all can hear). • Teacher pauses the feedback and makes revisions to the draft, explaining aloud each decision and move. • Teacher restarts the feedback and continues the process until all audio feedback has been addressed on the draft.
Self-Talk	Teacher uses self-talk to explain their thinking including self-statements to: • Get started (e.g., What is my task? I can use my strategy for this). • Stay on task (e.g., I am ¼ done; I can do this). • Acknowledge and overcome frustrations (e.g., This is hard, but I can do hard things). • Celebrate completed tasks (e.g., I made revisions to half my essay).
Final Version	Teacher writes the final version incorporating the revisions, explaining aloud each decision and move.
Review	Teacher reviewed the whole process asking students to recall each step.

Model Lesson 2	
Overview	Teacher duplicates Lesson 1, but with gradual release of responsibility to student.
Gradual Release	Teacher facilitates instruction by: • Letting students start and stop the app. • Asking students guidance for next steps. • Responding to audio feedback with student input. • Writing the suggested revisions on the draft.

Practice Lessons		
Overview	Students were given at least six opportunities to listen to audio feedback using headphones, revise their drafts, and write a final version.	
	Content	**Materials Provided**
Lessons 1-3	Students revise three drafts written in response to baseline (pre-instruction) probes.	• iPads with Notability app • Headphones • Teacher audio feedback • Student checklist to guide revisions • Pencils for first drafts • Pens for revisions
Lessons 4-6	Students revise three additional drafts.	

Audio Feedback Fidelity Checklist for Persuasive Essays with Grade-based Variations

Greeting and reminder of the task.	Grades 1-2	Grades 3-5	Grades 6+
Greet the author; positive statement (e.g., I am excited to read your essay).	Yes	Yes	Yes
Read the writing prompt and directions aloud.	Recommended	Recommended	Recommended
Re-read previously written essay/story aloud.	Recommended	Recommended	Optional
Introduce and discuss each part of the Revision Checklist for the target genre.			
Tell what you believe with a topic sentence	Yes	Yes	Yes
Transition introducing first reason	Yes	Yes	Yes
Reason 1	Yes	Yes	Yes
Transition introducing first example and/or explanation	Optional	Yes	Yes
Explanation and/or Example 1	Example only	Either/Both	Both
Transition introducing second reason	Yes	Yes	Yes
Reason 2	Yes	Yes	Yes
Transition introducing second example and/or explanation	Optional	Yes	Yes
Explanation and/or Example 2	Optional	Either/Both	Both
Transition introducing third reason	Optional	Optional	Yes
Reason 3	Optional	Optional	Yes
Transition introducing third example and/or explanation	Optional	Optional	Yes
Explanation and/or Example 3	Optional	Either/Both	Yes
Counter Argument	No	Optional	Yes
End with a conclusion/summary	Yes	Yes	Yes
Mark any corrections on document (photo or paper). (Ex: punctuation needed, reminders of elements to include)	Optional	Optional	Optional
Give explicit directions to mark revisions on draft in different color based on feedback.	Yes	Yes	Yes
Give specific suggestions to improve essay based directly on student performance.	Yes	Yes	Yes
Give *specific* positive feedback.	Yes	Yes	Yes
Give explicit directions to produce a final draft from the corrections that were made .	Yes	Yes	Yes

Integrating Simulations as a Tool for Developing Robotics Skills in Technology Education

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The rapid change from traditional to online learning due to the global COVID-19 pandemic has given technology preservice teachers a difficult task of learning valuable skills that are normally offered with an in-person approach. The technology education curriculum consists on many hands-on courses in which they gain skills to transfer to their future classrooms. This paper specifically discusses simulations implemented in a robotics programming course to ensure technology preservice teachers are still receiving the training they need to be prepared for their future classrooms with implications for technology preservice teachers and instructors.

INTRODUCTION

The changing of traditional learning to an online environment puts technology education preservice teachers (PSTs) in a difficult situation with needing hands-on experience to develop the skills to become effective technology teachers. Technology education involves engaging PSTs with electronics, robotics programming, welding, engine work, and building amongst other hands-on activities to incorporate in their classrooms, some of which are not able to be completed fully online (Wicklein & Rojewski, 1995). Because of the importance of STEM education (White, 2014), one such imperative skill is for PSTs to learn robotics programming with hands-on programming experience to integrate into their future classrooms. With the quick transition to online learning, courses had to adapt and have started to integrate simulations as a replacement for hands-on learning. Simulations have been proven to be effective in education and have been utilized previously with teaching and learning robotics (Doswell & Mosley, 2006; Sottile & Brozik, 2004; Žlajpah, 2008).

INNOVATION

Part of technology education is preparing students for the consistently changing society, and the current situation is no different (Rennie et al., 2012). However, technological advances have led to use of tools that can augment or replace hands-on learning with a computer (Honey & Hilton, 2011; Scanlon et al., 2004). One tool for replacing hands-on learning is simulations. Simulations are able to replace and amplify real experiences in an immersive manner (Lateef, 2010).

Simulations have been utilized in many different fields such as medicine, education, and manufacturing and have benefits throughout (Grantcharov et al., 2003; Queen, 1984; Sottile & Brozik, 2004; Wayne et al., 2006). In technology education specifically, simulations have been utilized to teach electronics, programming, and construction (Chamas & Nokali, 2004; Mukherjee et al., 2005; Tellez, 2017). Simulations can also be utilized to teach specific skills such as robotics programming in an environment where students can build, test, and see results (Žlajpah, 2008). Simulations are beneficial because they provide students the opportunity to learn and develop skills, knowledge, and attitudes (Lateef, 2010). It is important to encourage debrief after the students finish the simulation and inquire about how these skills can be used in their future classroom (Keamy & Selkrig, 2013).

With all courses transitioning online, the Technological Studies Department integrated simulations in coursework to prepare PSTs for activities they will be implementing in their future classrooms. The technology courses at this university are integrated with both PSTs and other technology majors (manufacturing and construction), so coursework must apply to both groups. The technology PST program trains individuals to become technology teachers in high school

settings. Part of the technology education major curriculum is learning robotics programming, so they can integrate it in their curriculums in the future. The robotics course has a lab component with hands-on experience for programming a robot. Since the transition to online learning, simulations have been introduced in this course to teach these skills without having a robot in front of the students. These simulations are freely provided by robotics manufacturers and allow students to learn the basic layout of a program and how to integrate the robot with sensors and PLCs. One such example is using the free robotics simulations on Universal Robotics' website. The simulation provided by Universal Robotics was utilized in this course to ensure students were still gaining the skills they need to understand robotics programming and include several modules for learning the basics of a robotic program, how to integrate outside technologies, and how to develop code while being able to test immediately. Figure 1 shows a simulation after the student has built a robotic program.
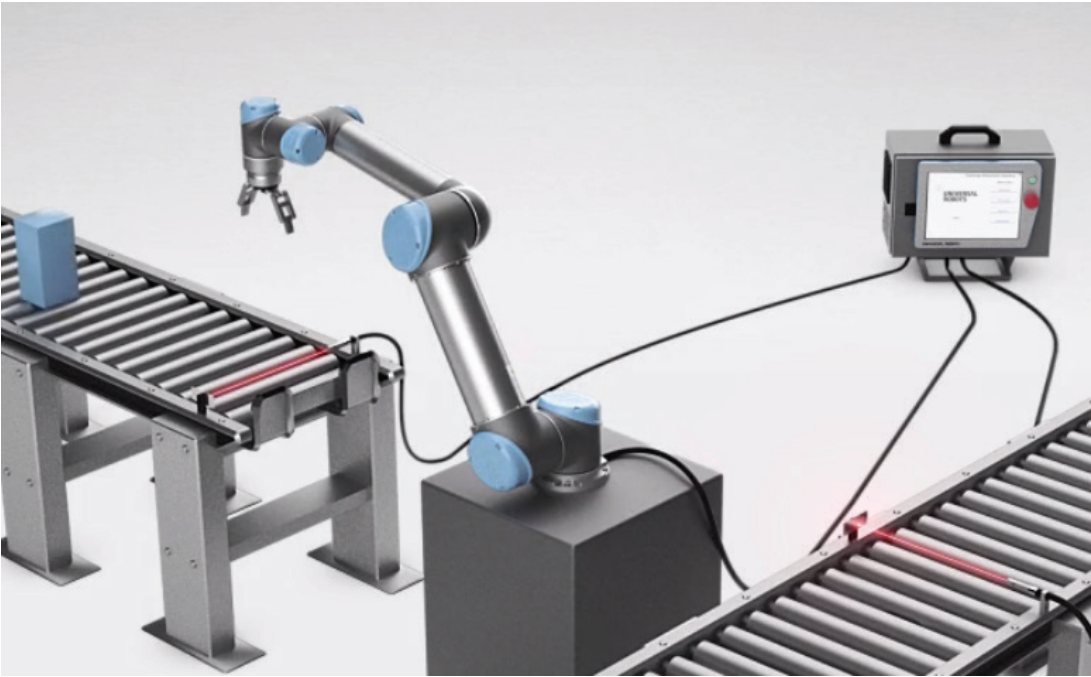

Figure 1. Robotics simulation. Retrieved from Universal Robotics Academy.

After completing the simulations, the students were to reflect on what they had learned and discussed how they could use those skills in their future classrooms or careers. This activity took place on a discussion forum within the Learning Management System (LMS).

While the simulations were able to be utilized to still train students on programming skills, the assignments for these labs had to change. Table 1 displays the lab assignment layouts for hands-on labs versus simulation labs.

Table 1
Robotics Assignments Face-to-Face and Online

Face-to-face assignment	Online assignment
Using the robot and a gripper end-effector, teach the robot to pick up a block and place it on top of another lock	Create a program online that allows the robot to pick a part from a conveyor and place it on the other conveyor
Using the PLC and sensor in the lab, teach the robot to notice when a block is passing it on the conveyor and send a signal to read the barcode on the attached computer	Write a program using the virtual teach pendant to pick up a part when the sensor is triggered on a conveyor
Trace the outline of a letter using the marker end effector and taught points	Trace the outline of the rectangular part using the gripper of the virtual robot

RESULTS

Previous studies have shown that learning robotics programming skills in a mixed-reality environment are effective (Doswell & Mosley, 2006). While there have been no analyses of learning outcomes from this intervention, PSTs are showing throughout their reflections that they are able to adapt these skills into future activities in their classrooms or careers. Students have commented on feeling like they are still learning the skills they need without being on campus by completing the activities on the simulations. One student commented, "even though I was upset about not having access to the robots in the lab, the simulations still taught me the skills I need to be able to program them in the future". Based upon the scores of the assignments in the course, students showed they were still learning the original objectives and skills that the hands-on experience would have provided. Students were also required to write a robotics program for their final exam and the average score on the final was 95.25%, indicating students could apply the skills from the simulations into creating programs from scratch.

IMPLICATIONS

While simulations are not a complete substitute for hands-on learning, they can still be beneficial. However, in times of crisis, they can provide PSTs the tools they need to gain programming skills to transfer to their future classrooms and students. Based on this implementation, there are direct implications for PSTs and PST educators.

PSTs should find opportunities to practice what they learned in the simulations in lab settings or with materials they have at home. While they can still gain experience from simulations, it does not completely make up for hands-on experiences (Corter et al., 2007). PSTs can purchase low-cost robots online (from Sparkfun or other electronics websites) or emulators to practice their skills from robotics programming. Other free robotics simulations include cyberbotics (https://cyberbotics.com/), V-REP (https://coppeliarobotics.com/), and Microsoft Robotics Developer (https://www.microsoft.com/en-us/download/details.aspx?id=29081). For courses beyond robotics, they could find materials in their homes to help develop other skills such as building and understanding electronics.

PSTs should consider implementing simulations in their technology classrooms in the future (Kallonis & Sampson, 2010). While this pandemic has caused a lot of unknowns in education, simulations can still be utilized for learning prior to implementing hands-on activities in the classroom even when schools are able to become face-to-face again.

PST educators should encourage reflection and application to activities students would use in their future classrooms. Teacher candidates need to understand how to transfer the skills they learned into creating activities in their future classrooms. Reflection is imperative as part of the learning process for PSTs and should always be included (Ward & McCotter, 2004).

This study provides early evidence that simulations can still aid in developing imperative skills for technology PSTs. Simulations can be a good addition to existing hands-on curricula but can be utilized alone in times of crisis.

FUTURE RESEARCH

Future research could explore learning outcomes for the addition of simulations to a hands-on curriculum for PST technology courses by comparing lab scores of students utilizing simulations against ones who were hands-on. Additionally, analyzing the debrief qualitatively after the students complete the simulations could also gain some insight into the effectiveness of online robotics simulations compared to hands-on experiences.

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Using Virtual Simulations and Videoconferencing to Rehearse and Enact Number Talks in Online Settings

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With the abrupt shift to online learning in higher education and K-12 settings, opportunities for preservice teachers (PTs) and inservice teachers (ITs) to work on enacting practice-based pedagogies in K-12 settings as part of coursework are suspended. This chapter describes how a virtual simulation and videoconferencing were used to rehearse and enact number talks in elementary mathematics methods courses. Considerations and recommendations for implementing practice-based pedagogies in online settings across content areas are suggested.

INTRODUCTION

Practice-based pedagogies (Grossman, et al., 2009) are an integral part of teaching mathematics. Number talks (Humphreys & Parker, 2015) serve as one instructional activity in which preservice teachers (PTs) and inservice teachers (ITs) work to improve high-leverage practices such as eliciting and responding to student thinking. Through a Cycle of Investigation and Enactment teachers (a) plan, (b) rehearse with colleagues and a teacher educator (TE), (c) enact with students, and (d) reflect (Kazemi, Franke, & Lampert, 2009; Lampert, et al., 2013). With the abrupt shift to online learning, opportunities for PTs and ITs to enact practice-based pedagogies in K-12 settings as part of coursework are suspended. This chapter describes how TEs used a virtual simulation and videoconferencing to rehearse and enact number talks with four sections of PTs in elementary mathematics methods courses and one section of ITs in a graduate elementary number and operations course. We then make recommendations for how to use the platforms to support teachers in the rehearsal and enactment of other instructional activities across content areas.

INNOVATION

At East Carolina University, number talks (Humphreys & Parker, 2015) are used as an instructional activity to work on eliciting and responding to students' thinking about multi-digit multiplication. A number talk is a short, daily number

routine that supports students in developing mental math strategies and fluency. Students solve a problem mentally, and the teacher uses talk moves (Chapin & Anderson, 2013) to prompt students to explain and make connections among solution strategies. Typically, PTs rehearse number talks with peers with real-time coaching from the TE and then enact the same number talk with K-5 students. They then analyze videos of the enactment using a media annotation tool (Colasante, 2011) for instances of eliciting and responding to student thinking.

With the abrupt switch to distance learning, TEs in our program implemented number talk rehearsals and enactments in the configuration that best suited their resources and the needs of their students in-the-moment. Figure 1 summarizes the rehearsal and enactment components of the different configurations used.

Configuration for Implementation	Rehearsal	Enactment
Modified videoconferencing rehearsal and face-to-face enactment with students of convenience	TE enacts a number talk in a whole-group videoconferencing meeting. PTs/ITs, in the role of students, solve problems mentally. The TE records solutions and models talk moves to facilitate discourse. PTs/ITs and TEs debrief instructional decisions and questioning.	PT teaches 3-5 number talks to students of convenience face-to-face (friends and family). Videos of number talks are uploaded on a media annotation tool for PT reflections. TE provides detailed feedback on enactment videos between each lesson using the media annotation tool.
Virtual simulation rehearsal and enactment	Prior to the rehearsal TE writes anticipated student solution strategies for each number talk problem to be used in simulation. Each of five avatar-students are matched with a strategy. TE meets with small groups of four PTs to do virtual simulation remotely through videoconferencing. Each of the four PTs facilitates a ten-minute number talk with the five avatar-students for one problem in a progression (For example, 4 x 35, 6 x 35, 8 x 35, 16 x 35). TE coaches in between each number talk. PTs in the group of four hear all rehearsals and coaching.	PTs conduct an additional number talk with avatar-students in virtual simulation with less coaching from TE. Videos of number talks are uploaded on a media annotation tool for PT reflections.
Virtual simulation rehearsal and videoconferencing enactment with elementary students	Virtual simulation rehearsal as described in the above row. Videos of number talks are uploaded on a media annotation tool for reflections.	PTs/ITs conduct number talks with small groups of elementary students using videoconferencing.

Figure 1. Configurations of Implementation for Number Talk Rehearsals and Enactments.

One TE was already using a virtual simulation lab on campus (http://ecu.edu/mursion) to rehearse number talks with a small group of avatar-students (Lee, et al., 2018), so PTs were able to continue their rehearsals remotely using videoconferencing to engage in the simulation. The simulation utilizes anticipated student solution strategies (see Figure 1) for upper elementary students solving the problems 4 x 35, 6 x 35, 8 x 35, 16 x 35. Four PTs and the TE meet to rehearse. Each PT facilitates a ten-minute number talk with five avatar-students; each avatar-student matched with one of the solu-

tion strategies. The TE coaches between each number talk. Number talks build upon one another with the avatar-students "remembering" what took place in the previous number talk.

Number Talk Problem: 35 x 6

Student	Possible Student Response
A	I thought of it like 6 groups of 35. Then I knew 4 groups of 35 was 140 because of the last problem. Then I just needed 2 more groups of 35. I added 35 and 35 to get 70. 140 and 70 is 210.
B	I thought of 6 as 3 x 2 Then I doubled 35 to get 70. I would need to do this 3 times. This would be 70, 70, and 70. Which would be 70, 140, 210. So my total is 210
C	I multiplied 30 x 6 to get 180 and then 5 x 60 to get 30. 180 and 30 added together is 210.
D	I added 35 and 35 to get 70. This was 2 35s so I knew I needed to do that 3 times to make it 6 of them. So I knew 3 times 70 would be 210 because 3 times 7 is 21.
E Incorrect	I did 5x6 and got 30 and then did 3 x 6 and got 18. So 18 and 30 is 48. But that seems too small. This student sees the 3 in 30 as only 3 and not 3 tens.
F Incorrect	I thought of 6 as 3 x2 Then I multiplied 35 by 2 to get 70. Then I multiplied 35 by 3 to get 105. Then I added these together to get 175. This student factored 6 but instead of multiplying in different orders she/he distributed the 35 to each factor which is a misconception. The student is seeing the factors as addends.

Figure 2. Sample Anticipated Student Solution Strategies.

Teacher educators not already using the simulation conducted modified rehearsals using videoconferencing. PTs/ITs engaged in a number talk as students with the TE as the instructor and then debriefed the teacher's instructional decisions and questioning.

For the enactment component of the cycle, some PTs (n = 53) had additional experiences in the virtual simulation environment with less coaching. Other PTs (n = 55) taught a series of three to five number talks to a small group of convenience--elementary students when possible, friends and family if needed. The TE provided feedback on the videos between each enactment using a media annotation tool in which videos can be marked with text. ITs (n=25) began with the modified rehearsal experience through videoconferencing, engaged in the simulation, and when possible, conducted number talks with their own elementary students using videoconferencing.

RESULTS

All PTs and ITs in each configuration of implementation submitted video-recorded enactments and reflections using a media annotation tool (See Appendix for reflection directions). These data will be analyzed formally for the use

of talk moves to elicit and respond to student thinking including revoicing, re-stating, wait time, prompting for further participation, and asking a student to comment on another student's thinking (Chapin & Anderson, 2013). In a preliminary review of the data while grading reflection assignments, PTs and ITs in all configurations were able to annotate use of talk moves in video-recorded enactments and demonstrate an understanding of students' multiplication strategies. With analysis, we hope to better understand the affordances and constraints of the different configurations and to make research-based design recommendations for planning rehearsal and enactment of high-leverage teaching practices in online settings.

IMPLICATIONS

Teachers' success rehearsing and enacting number talks with students (avatars, adults, or actual K-5 students) indicates that practice-based teacher education (Grossman, et al., 2009) can be actualized in online settings. First, we share lessons learned about implementing number talks in different configurations of virtual simulations and videoconferencing. We then offer considerations when planning rehearsals and enactments in any content area.

Configuration for Implementation	Lessons Learned	Considerations about Resources
Modified videoconferencing rehearsal and face-to-face enactment with students of convenience	Even though the PT's students were often adults, they had not been exposed to different multi-digit multiplication strategies. Therefore, strategies shared in the number talk were similar to those that might be used by elementary students. The rehearsal and enactment components were merged together through continuous coaching between number talks using a media annotation tool. Real-time coaching and feedback from the TE is not included.	Can be implemented immediately as the modified videoconferencing rehearsal is just a modeling of the activity as conducted in a face-to-face class but on a videoconferencing platform Videoconferencing platforms and media annotation tools are free or inexpensive Requires very little synchronous time which is helpful for students with insecure internet connectivity and allows for flexibility due to changing home situations during the pandemic
Virtual simulation rehearsal and enactment	Real-time coaching feedback with TE and peers is powerful in refining practice. Allows for rehearsal to occur with avatar-students rather than peers playing the role of students Student thinking profiles designed to introduce particular solution strategies and misconceptions allow for targeted practice. Does not allow for engaging with non-avatar students.	Requires access to virtual simulation software for TE or financial resources to use an existing virtual simulation (like the number talk simulation described here) Requires frequent synchronous meetings through videoconferencing to engage in simulation.
Virtual simulation rehearsal and videoconferencing enactment with elementary students	PTs/ITs experience the real-time coaching and peer collaboration as well as the targeted practice in virtual simulation rehearsals. Engaging with K-5 students provides PTs/ITs experience with the discourse and representations used by elementary students.	Requires access to virtual simulation software for TE or financial resources to use an existing virtual simulation Requires frequent synchronous meetings through videoconferencing to engage in simulation Requires access to K-5 students through established partnerships

Figure 3. Lessons Learned and Resource Considerations by Configurations of Implementation.

Each configuration for implementation has specific lessons learned and considerations about resources (see Figure 3). Across all configurations, feedback and coaching is as imperative as it is in face-to-face settings (Shantz & Ward, 2000). All configurations were time intensive for the TE, but how the feedback was incorporated had different implications for where the time was spent. In the simulation, coaching time was spent in multiple small-group synchronous videoconferencing sessions (one hour per every four teachers). In the modified videoconferencing rehearsal with face-to-face enactment with students of convenience, the TE's coaching time was spent giving feedback to video recorded lessons.

Often the rehearsal and enactment components of the cycle became less distinct in online settings. The rehearsal in the videoconferencing only configuration was split between the whole-group modified rehearsal feedback and the TE's feedback using the media annotation tool between enactments. In the simulation, rehearsals were facilitated with avatar-students rather than peers acting as students, and enactments used the same simulation with less coaching. Only the rehearsal in the virtual simulation and enactment with elementary students using videoconferencing most closely approximated the typical experience in which rehearsals and enactments are distinct from each other. This configuration allowed for both the targeted, collaborative practice with real-time coaching from the TE and the experience with K-5 students. However, this implementation required groups of elementary students that were already established (a PT already working with a group of students as part of honors thesis research, ITs working with their own students). To implement this configuration large-scale, TEs need to plan in advance with K-12 partners for future quick transitions to online instruction.

Rehearsal and enactment can be implemented in any content area in which TEs want to incorporate practice-based pedagogies (Grossman, et al., 2009) in online settings. Based on our work, we offer the following considerations for planning:

1. Decide on a high-leverage teaching practice. High-leverage practices are those practices most essential to the work of teaching in terms of impact on students and that can be easily accessed by beginning teachers (Ball, Sleep, Boerst, & Bass, 2009).
2. Choose an instructional activity as a context for teachers to learn the high-leverage practice. We recommend a focused, short instructional routine of 10-15 minutes or less to keep videos from being too long and time for TE feedback manageable. Choose content in which you can incorporate research-based student strategies and misconceptions.
3. Decide where you want to spend your time as a TE. Do you want more synchronous, small-group meetings or the flexibility of giving feedback asynchronously between enactments?
4. Consider your technology resources. Do you have access to virtual simulation software or financial resources to use existing simulations from other universities? Note that even if you do not have access to virtual simulations, targeted, small-group synchronous rehearsals with real-time TE coaching are still an option by utilizing video-conferencing and a protocol in which each peer-teacher takes on a different student solution strategy.
5. Consider your access to K-12 students. Will adult students of convenience be able to engage in the instructional activity authentically or will they have to pretend not to know the material to engage as "students"? Do you have existing partnerships through which you could arrange videoconferencing enactments with K-12 students?
6. Plan how teachers will show evidence of the high-leverage teaching practice. Consider a media annotation tool in which teachers can upload their video and mark points of evidence with text entry for reflections.

Even in this unprecedented time, powerful practice-based learning opportunities can be accomplished in online settings.

FUTURE RESEARCH

Moving forward, research examining how simulations and videoconferencing can be used for rehearsals and enactments will help TEs understand what the various platforms and configurations offer in developing pedagogies of practice. Next, we will analyze PTs' reflection assignments. Anticipating that it might be some time before PTs are able to do practica in K-12 settings, we will use this analysis to refine additional online implementations of the Cycle of Investigation and Enactment (Kazemi, Franke, & Lampert, 2009; Lampert, et al., 2013) both for number talks and other instructional activities with the longer-term goal of making research-based design recommendations.

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APPENDIX

Number Talk Analysis Assignment

Using your recorded number talk in GoReact take a thoughtful look at your number talk rehearsal. Use the following prompts to help you analyze your practice and the mathematics involved. Download and type within this word document so that subheadings/questions will stay organized.

Record your Number Talk Problem here:

1. Select two student responses from your number talk (Labeled as Student A and Student B below). Explain each student's way of thinking. What is the logic behind the strategy? Why does it work? Include a discussion of the properties of number that are being used (distributive, commutative, associative, identity, zero property).

    STUDENT A

    STUDENT B

2. Devise another problem for which it would be efficient for a student to use the same reasoning as Student A. Show how to solve the problem with the student's strategy.

3. Devise a problem for which Student A's strategy would not be efficient. Explain why it would not be efficient with that strategy.

4. Discuss the experience of teaching a number talk. Be sure to address the following in detail: What did you learn about students thinking from the number talk? What did you do as the facilitator that you were proud of and what specifically do you want to improve? What were some benefits of the simulation experience? What would change about the experience?
5. Use of Talk Moves

Watch your video in GoReact. Use the marker function to insert a marker/tag in your number talk where you used each of the talk moves (one example of each). Label with the talk move. When you review your video if you did not use a talk move, please insert a marker/tag where you could have used the talk move (label as well).

In the chart below, include a timestamp of where you placed the marker. Finally, watch the segment again and record a quote of the talk move (accept for wait time). Analyze how the talk move affected your number talk. Consider how the talk move impacted how the student/s shared their idea/s and how you used their response. Be specific and cite student quotes to support your ideas.

If you did not use the talk move, and instead found a place where you could have used it, please record how you anticipate the talk move to affect the number talk. Consider how the talk move would impact how student/s shared their ideas and how you could use their responses. Be specific and cite the actual student response in your reflection as you describe how you anticipate them to change.

For each Talk Moves you are typing:
- Quote that captures the talk move or proposed quote
- Explanation of how the talk move affected the number talk. Use specific examples and cite student quotes to support your ideas.

Talk Move	Time Stamp	Quoted Move and Impact of Move
Wait time Wait at least 5-7 seconds before calling on someone (bonus points if other than when launching initial problem)		
Revoicing (Ex: So you're saying…)		
Restating Asking students to restate someone else's reasoning (Ex: Can you repeat what he just said in your own words?)		
Apply reasoning Asking students to apply their reasoning to someone else's reasoning (Ex: Agree/Disagree and why; What similarities or differences do you notice between…; Why does XXX's strategy work)		
Prompting Prompting students for further participation/explanation (Would someone like to add on? Tell me more. Why did you...)		

Creating Online Maker Education Courses Incorporating Invention Kits and Desktop Manufacturing

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The COVID-19 pandemic required the transition of a maker education course for teacher education students to an online format. A series of *Make to Learn Invention Kits* anchored the course. These kits, developed in collaboration with the Smithsonian Institution, enable students to reconstruct transformational inventions in history. Students use the foundational concepts attained in this way to create their own innovations.

Because students no longer had access to maker tools such as 3D printers, CAD files developed by students were used by instructors to fabricate components for projects. The fabricated parts were then shipped to students by mail. Students were able to complete their maker projects successfully using this adapted design cycle. Student responses to a course evaluation at the end of the semester were positive. The resources developed for the online maker education course are available to other schools of education on the *Make to Learn* website (www.maketolearn.org).

INTRODUCTION

In 2005 Neil Gershenfeld published a prophetic book titled *Fab: The Coming Revolution on Your Desktop from Personal Computers to Personal Fabrication* (Gershenfeld, 2005). He predicted that in the near future the equivalent of a desktop factory would enable consumers to design and make anything in their homes. The term *desktop manufacturing* was adopted to describe use of desktop fabrication machines such as 3D printers. Affordable desktop fabrication machines fueled development of the maker movement and associated maker spaces in schools, libraries, and community centers. Makerspaces provide the technological tools used to design and build physical objects; use of the tools creates experiences that contribute to understanding of how objects work (National Academy of Sciences, Engineering, and Medicine, 2018).

Gershenfeld's book also inspired a collaboration among the School of Education and Human Development at the University of Virginia, the School of Engineering and Applied Science at Princeton University, and the Society for Information Technology and Teacher Education (SITE). The *Make to Learn* coalition was formed by these collaborators with the goal of identifying effective ways to employ school maker spaces for teaching and learning.

The pedagogical basis for this work is grounded in a framework developed by the late David Billington and Michael Littman at Princeton University (Littman, 2020). Their premise is that foundational inventions such as the telephone, the telegraph, and 19th-century relays use minimal parts and, therefore, can be easily understood. Their operation is more accessible to learners than the black box of modern-day engineering systems such as cellular phones and solid-state relays (Billington & Billington, 2013).

The coalition developed a series of *Make to Learn Invention Kits* in collaboration with the Smithsonian Institution. Pivotal inventions now archived in the Smithsonian Institution – such as the telephone, the telegraph, and early electric motors – changed the course of history. *Make to Learn Invention Kits* enabled students to use school makerspaces to reconstruct these transformational inventions.

Make to Learn Invention Kits provide online resources that include the following: (1) a scanned 3D image of the invention digitized by the Smithsonian, (2) a CAD model of the invention, (3) animations that depict its operation, (4) related historical resources in the Smithsonian's collections, such as patents and descriptions from inventors' notebooks, and (5) accompanying professional development materials (Bull, Standish, Johnson, & Haj-Hariri, 2016). Students in K-12 schools not only use these online resources to reconstruct historic inventions, they also extend them to create their own original inventions.

This work formed the basis for an introductory maker education course at the University of Virginia, An Introduction to Design through Making. This course anchors a maker education strand (Bull, Garofalo, & Rutter 2018) in the education school. The course is taken by both education students and students from the college of arts and sciences. A variety of tools such as 3D printers, laser cutters, vacuform systems, and a hydraulic press in the *Make to Learn Laboratory* provide fabrication capabilities that support the course. Some of the materials and activities developed in this course have also been used in subject-specific pedagogy courses offered for teacher education students, including mathematics education, language arts, and social studies pedagogy courses for preservice teachers.

Similar tools are used to support studio courses for students at Princeton. The Princeton courses include a popular maker course for non-technical students with an average enrollment of about 100 students each year. An advanced course for Princeton engineering students enables them to use fabrication tools and microelectronics to automate a model railroad.

Table 1
Types of Maker Courses

Audience and Instructional Objectives	Tools
Preparation for School Maker Spaces	Foundational
Scientific Literacy and Personal Enrichment	Intermediate
Engineering Education	Advanced

The three courses share a common philosophy and goals, but differ in the levels of the tools and sophistication of the design software employed. The maker course developed in the education school, of necessity, focuses on tools and software typically found in school makerspaces. In contrast, the course tailored for engineering students makes use of computer aided engineering analysis (CAE) software with finite element modeling and animation capabilities.

Table 2
Levels of Design Software

Level	Application	Time Required to Introduce
Foundational	Tinkercad	Single Class Period
Intermediate	Fusion 360	Several Class Periods
Advanced	Solidworks	One Semester

For example, Tinkercad is the 3D design program currently used in the maker course for preservice teachers. Its capabilities are basic, but students can begin creating 3D-printed designs within a single class period. This program is freely available for use without charge. In contrast, Solidworks is a design program used by professional engineers. A single license for its use can cost hundreds of dollars.

Despite the differences in technical sophistication and cost, the underlying principles are the same. Similarly, the design principles underlying use of a $100 digital die cutter are the same as the design principles governing effective use of a $25,000 laser cutter. One fabrication tool can cut thin materials such as cardstock while the other can cut wood and plastic, but the design methods underlying their use are similar.

Activities developed in one of these courses can inspire related projects in one of the other courses. A weekly video-

conference between the instructors at the University of Virginia and Princeton is used to compare, coordinate, and plan activities and projects that span courses. Therefore, when the COVID-19 pandemic required the transition of all three studio courses to an online format, the joint planning for this transition was continued. The sections that follow describe similarities and differences in the methods used, results and lessons learned, and plans for the future.

INNOVATION

Three basic methods or strategies were employed to address the transition to an online format at the midpoint of the semester.

1. *Desktop Manufacturing Systems*
   The premise of Gershenfeld's (2005) book was that affordable fabrication systems that would fit on a desktop would be available to consumers. Therefore, one approach to supporting a transition to an online format might be to transfer fabrication tools in a university makerspace to students for use in their homes. Placing fabrication tools in a common makerspace has obvious advantages. Students working together can inspire one another and assist in troubleshooting when problems arise. However, when working together in a common makerspace is no longer feasible for students, transferring tools to students for home use offers an alternative pathway.

2. *Remote Design and Fabrication*
   Some tools are too costly, complicated, or large for students to use in their homes. In some instances, safety is also an issue. For example, a hydraulic press in the *Make to Learn Laboratory* cost $2,000 and weighs several hundred pounds. In these instances, remote design and fabrication provides an alternative strategy. In this case, the student designs the component using software at home and then transmits the CAD file electronically for fabrication in the central makerspace. Once parts have been fabricated at the central location, they can be shipped to the student for assembly and testing at home.

3. *Simulation Software*
   A third option is use of a simulation. The student designs a component or circuit and then uses a simulator to troubleshoot problems. Facility with simulation software is a useful design skill because it enables students to identify and troubleshoot problems before fabricating physical components, saving time and expense. In some cases, simulation software may be the only feasible option in an online format.

All three of these strategies were implemented to various degrees in the spring 2020 semester. They are being more fully developed and expanded for the fall 2020 semester.

A typical design cycle in a maker project consists of (1) conceptualization of a design, (2) realization of the design using Computer Assisted Design (CAD) software, (3) use of the CAD files to fabricate the components using tools such as 3D printers and laser cutters, and (4) final assembly of the components and testing. In instances in which electronic components and a microcontroller such as an Arduino are used, an additional phase involving coding and circuit testing may be required.

Since in spring 2020 the students taking the course no longer had access to the fabrication tools in the school makerspace, the course instructors and staff used the CAD files created by the students to fabricate the parts for them. The fabricated parts were then shipped to the students via surface mail for assembly and testing.

RESULTS

All of the participants in the respective courses were able to complete their projects successfully using the adapted online format. Several challenges were inherent in this format, however. One challenge is the lag time introduced by the process of shipping components to students via surface mail. In the local version of the course before the pandemic, students at the University of Virginia could work through a half-dozen iterations of a laser-cut part in the course of an afternoon, as they refined the components for a project. After classes were moved online, we had students participating from as far away as Panama and South Korea. Once fabrication files were received from students, we used videoconferences to share the results of fabricated components with students and collaboratively develop revised versions if needed.

The University of Virginia developed an online survey to secure feedback from students regarding their experience taking classes in an online format. All of the students in the Maker Education course responding to the survey reported

that they either *Agreed* or *Strongly Agreed* that the course had been effective in its adapted format. One student commented, "You have made this course a great experience. I have definitely enjoyed my time designing this course's projects!" Another student said, "Thank you all so much for this semester. This has been one of the most relaxing and fun classes I've taken." Based on these responses to the initial offering, it appears that a maker education course for teacher education students can successfully be offered in an online format.

The students in the online studio courses at Princeton also were successful in creating original designs and projects using the adapted online format. For example, one student developed an original project to sort coins. The final mechanism was able to sort pennies, nickels, dimes, quarters, half dollars, silver dollars, and Eisenhower dollars. Some items available on site – such as a tachometer – were not included in the components of the kit provided. The student was able to compensate by dissecting a gear-motor and extracting the direct drive portion – a DC motor when spun acts as a tachometer, producing a voltage proportional to speed – to create a sensor. All of the students created working projects of original design.

The *Make to Learn Invention Kits* used in the adapted online maker education course are hosted on a website maintained by the Society for Information Technology and Teacher Education, which can be accessed at www.maketolearn. org (Figure 1).
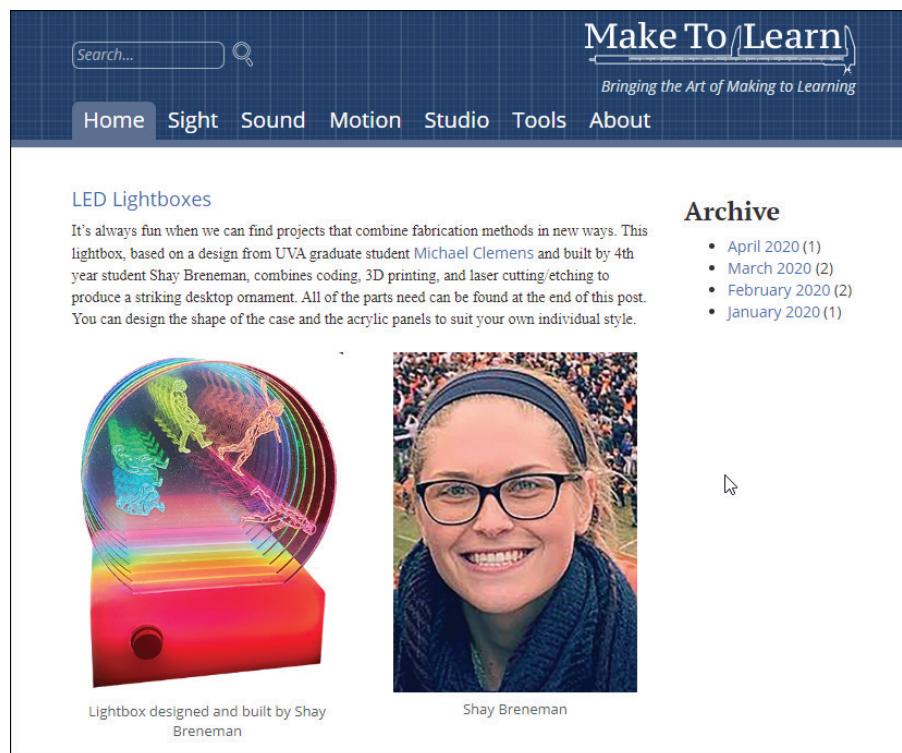

Figure 1. The Make to Learn Website (www.maketolearn.org) provides online resources.

The *Invention Kits* available on the website (Figure 2) are organized by themes that include *Sight*, *Sound*, and *Motion*. For example, the *Sound* tab includes *Invention Kits* that enable students to design and fabricate a working loud speaker or an electric guitar.
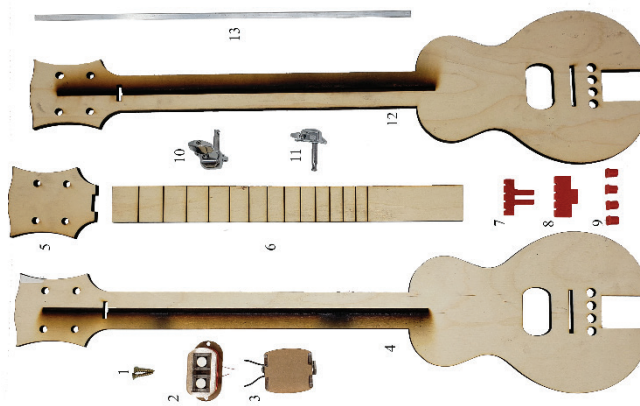
Figure 2. Each Invention Kit includes fabrication files and resources for replication of inventions.

IMPLICATIONS

The original intent underlying SITE's participation in development of Make to Learn Invention Kits was to enable students and instructors using makerspaces to access resources that were previously available only through a visit to the Smithsonian. While in an ideal environment, students would have direct access to fabrication tools such as 3D printers, much of the creative work lies in use of design software to create an original design. The adapted use of these kits demonstrates that they can also be effectively employed in an environment in which students do not have direct access to fabrication tools themselves.

At the time this is written, the University of Virginia and Princeton have not finalized the formats for fall courses. However, instructors have been asked to prepare for the possibility that courses will need to be offered in an online or hybrid format. Therefore, the instructors and staff are developing a Make to Learn Creativity Kit that will be shipped to course participants at the beginning of the course. The kit will include a Silhouette Portrait digital die cutter and a Hyperduino kit (https://hyperduino.com/starterr-kit.html) developed by Roger Wagner that includes an Arduino microcontroller and associated electronics. The combined cost of each kit is approximately $200. In this instance, the cost of the kits is being defrayed by internal seed funding. However, it may be feasible to offer the kit in place of a required text book in future iterations of the course.

Several implications can be suggested related to offering the course in this revised format in the future.
1. The course will be accessible to more diverse audiences. Until now, it has only been possible to offer the course to students who are at the university. Increasingly, students in the school of education are enrolling in online degree programs that do not require them to attend classes in person on the campus. Offering the courses in an online format will allow the full range of students enrolled in education degree programs to participate.
2. By providing an inexpensive fabrication tool in the form of a digital die cutter, students will be able to develop prototypes using materials such as cardstock and vinyl before transmitting CAD files for fabrication in materials such as plastic or metal. This approach will enable students to experience the full design cycle when developing prototypes.
3. Because students will keep the tools provided in the *Creativity Kit*, they will be able to continue using these design tools when they become employed by schools after completing their degrees.

RECOMMENDATIONS

Based on the results and outcomes of the initial online implementations, we have the following suggestions and recommendations for others who are planning online studio courses.

1. *Extend the Boost Phase*

   An engineering approach to project development consists of several phases that include (1) initiation and planning (brainstorming and preliminary design), (2) budgeting and scheduling, (3) construction and implementation, and (4) presentations and reviews of outcomes. In an online course, we have found that extending the boost phase (i.e., the initial planning and design, budget, and scheduling) can yield improved outcomes. Because of the overhead involved in remote implementation and coordination (latencies associated with shipping parts, etc., to remote sites), we found that it was productive to spend more time working with individual teams at the beginning to ensure a higher probability of success.

2. *Facilitate Teamwork through Differentiated Roles*

   The collaboration that is a serendipitous outcome of working in a shared makerspace must be explicitly scaffolded in a remote learning environment. In the next iteration of these studio courses, we are planning to provide different team members with different types of resources. For example, one member of the team will be provided with a 3D printer while another team member will be given a kit of electronics components. The team members will need to collaborate and work together to successfully complete a project. This approach is also a more parsimonious, since rather than purchasing one 3D printer for each member of the team, a single unit can be assigned to one member of the project who will assume responsibility for this aspect of the project.

3. *Collaboration with Corporate Partners*

   By its very nature, an applied maker course requires more physical resources and consumable supplies than does a theoretical course that entails use of few if any physical resources. Developing online extensions entails additional expenses and overhead associated with shipping costs and so forth. Collaboration with corporate partners cannot eliminate these additional expenses entirely, but it can reduce costs. The members of the *Make to Learn* consortium have always worked closely with corporate partners to ensure that maker resources are aligned with the needs of educators. This type of resources can become even more beneficial in the implementation of an online maker course. For example, Silhouette America has agreed to provide digital die cutters to students at wholesale cost in the next implementation of the *Design through Making* course. The cost ultimately will be about the same as the cost of a textbook, making continued implementation of this model more sustainable.

4. *Provide Bounded Spaces for Exploration*

   Students working in a physical makerspace are often encouraged to make their imaginations the only limit. Teaching an online maker course is much more intensive in terms of both staff time and physical resources. One way of making this course more feasible is to provide bounded spaces for exploration. For example, one of the Princeton courses focuses on design of model trains, while a future course planned for the University of Virginia will focus on design and fabrication of musical instruments. A bounded approach makes development of online resources such as instructional videos more feasible and increases the likelihood of student success. Students still have the flexibility to pursue a wide range of possibilities within a given theme, but constraining the range of projects in this manner allows limited resources to be more focused and in-depth in support of projects.

FUTURE RESEARCH

All of the materials and resources developed to support this work (instructional videos, interactive tutorials, CAD files, etc.) will continue to be made available to other schools and colleges of education on the *Make to Learn* website (www.maketolearn.org). This strategy offers the possibility of preservice teacher education students collaborating across universities at some point in the future.

To explore these collaborative possibilities, the *Make to Learn Creativity Kits* are being piloted with institutions in Maine and Colorado in summer 2020. Based on the results, the materials will be refined and updated before the Maker Education course is offered again in revised format at the University of Virginia in fall 2020.

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Digital Assessment for Learning – An Early Snapshot of the DADLIS Project

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One of the most powerful pedagogical techniques a teacher can employ is formative assessment i.e. Assessment for Learning (AFL). Formative assessment practices are methods of feedback which inform teaching and learning activities. DALDIS is an Erasmus+ Digital Assessment for Learning project. One of the project's key objectives is to assess the impact on student learning using technology enabled formative assessment which will be tested in six countries. This paper provides a snapshot overview of the projects initial pilot implementation in Ireland and some interesting and unexpected usage patterns in light of Covid-19. The need for teachers to acquire both assessment literacy and technology competences in order to utilise eAssessment systems effectively is also highlighted along with the impending implications for teacher training

Keywords: Digital Assessment for Learning; Data Analytics; eAssesment; Feedback; Assessment literacy; Covid-19; Erasmus+; STEM; Modern Foreign Language Learning

INTRODUCTION

The DALDIS (Digital Assessment for Learning informed by Data to motivate and incentivise students) Project is a three year EU funded Erasmus+ eAssessment Project that commenced in 2019. Led by Dublin City University, Ireland, and involving six European countries DALDIS is pilot testing and adapting a digital assessment for learning solution designed to drive students' learning progress using well designed question sets and student feedback. Assessment for Learning (AFL) or formative assessment using digital technology has great potential for teaching and learning (Maier, 2014; Russell, 2010) but is still in its infancy and not widely used in European classrooms. DALDIS is addressing this gap by researching the application of AFL methodology for Science Technology Engineering and Maths (STEM) and modern foreign language learning (MFL) using technology.

DALDIS is underpinned by AFL theory and educational technology. The project is built on the principle that formative assessment is one of the best methods to encourage student achievement (Hattie, 2009) and William and Black's (1988) definition of formative assessment practices as methods of feedback which inform teaching and learning activities. Good assessment practices are essential for learning and teaching and the increased use of technology in education has been demonstrated to improve assessment at various levels (JISC, 2007). However, the implementation of formative assessment in education has proven to be challenging (Birenbaum DeLuca, Earl, Heritage, Klenowski, Looney…Wyatt-Smith, 2015; Marshall & Drummond, 2006) due to deficits in both teachers' assessment literacy skills ((Doolin, Black, Harlen & Tiberghien, 2018, Popham, 2011) and technology skills. Teachers need to be assessment-literate and technology literate to effectively utilise eAssessment systems (Lee, Feldman & Beatty, 2012; Feldman & Capobianco, 2008). Research has shown that the role of assessment literacy in teacher education programs is limited (DeLuca and Bellara, 2013), that the successful implementation of AFL requires long-term professional development (Gottheiner & Siegel, 2012) and that greater investment is needed in teacher education to exploit the potential and usage of technology in the classroom (OECD, 2015; Stringer, Lewin & Coleman 2019).

INNOVATION

The backbone of the project is the Study Quest technology platform (www.study-quest.com) developed by one of the project partners. Its design has been influenced by Ireland's Revised Junior Cycle Curriculum, a 3 year programme aimed at 12-15 year olds. Ireland is the first country in the DALDIS consortium to adapt the Study Quest platform for

its curriculum. Known as JCQuest (www.jcquest.ie) this innovative resource comprises multiple choice question-sets derived from one of the core curriculum textbooks which ensures the assessment material fully aligns with classroom lessons. Similar adaptations, working models and curriculum aligned question-sets will be implemented for the other partner countries (Poland, Greece, Turkey, Denmark, UK) over the project's lifetime.

The Study Quest methodology is informed by assessment for learning research; in particular Hattie and Timperley's (2007) guidelines on feedback serve as the systems conceptual framework. A key feature of the project design is the use of carefully designed 'Feedback' for all questions that helps to 'nudge' students towards the right answer (figure 1), reinforcing basic knowledge and conceptual understanding, and effectively introducing and teaching the next concepts. Investigative questioning is supported through carefully designed questions to encourage students to research additional information working individually or collaborating to think through topics more deeply to find answers.
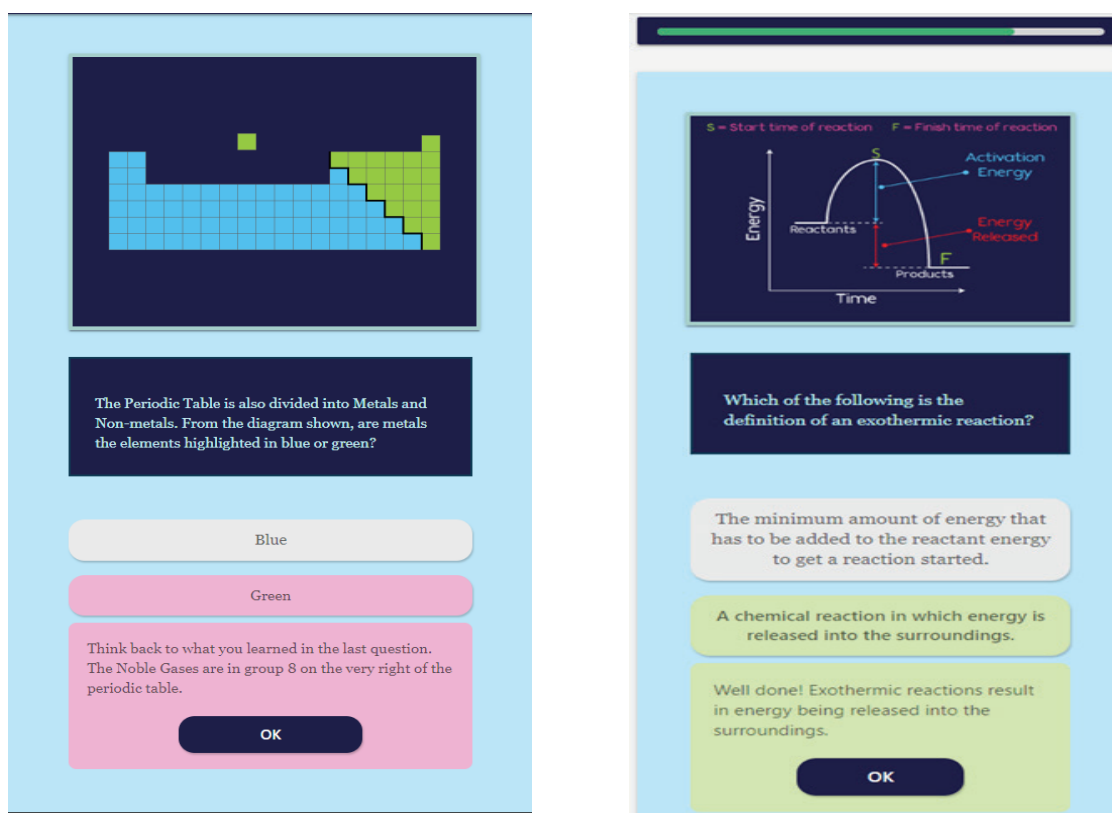

Figure 1. Feedback for RIGHT and WRONG answers Supports the student with positive 'nudges' in JCQUEST.

At a technical level Study Quest incorporates the most important elements of a robust eAssessment system including ease of use and accessibility, interoperability, security and effective feedback features to provide vital information to students and teachers. Importantly, it has been designed to support a variety of systems, devices, and browsers at school and at home (Tomasik, Berger & Mosser, 2018). It also provide functionalities to manage student assessment data such as background statistical information and analysis of student progress (Figure 2). Using Study Quest, a teacher can monitor student progress and assignments on an ongoing basis.

Figure 2. Data Supports the Teacher & Helps Drive Improvement in the Assessment Methodology in JCQUEST.

RESULTS

Pilot testing for DALDIS commenced with a soft launch of JCQUEST beta version in January 2020, followed by a more targeted promotion for teachers attending the CESI (www.cesi.ie) technology conference on February 29th. Initial take up was slow but when Covid-19 struck and schools abruptly closed on March 12th, there was a dramatic increase in usage as illustrated in figure 3.

Although just a snapshot this system generated data reveals a number of interesting trends. Firstly, there is a 5 fold increase in average weekly users from just 46 pre Covid-19 to over 200 post Covid-19, indicating that the system is fulfilling a need in light of school closures.
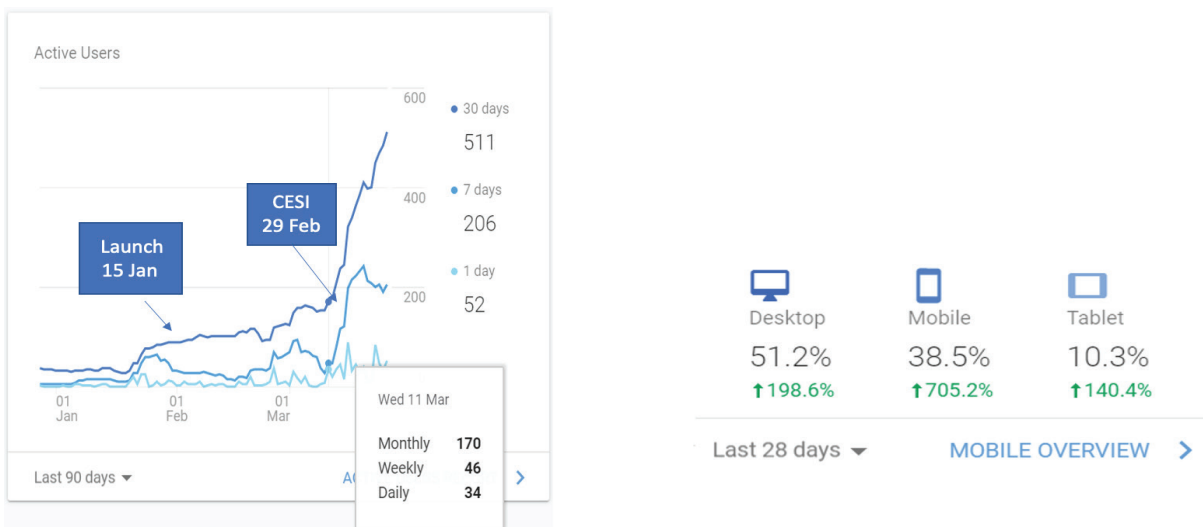
Figure 3. DALDIS Irish Launch & Covid-19 Emergenc.

Secondly, the most popular log in times are from 11 till 12.30, followed by afternoons between 2 and 4 pm. Another activity spike occurs between 6 and 8 p.m. which may be homework related. Thirdly, students spend an average of 45 minutes on each question-set which is evidence of good engagement. Fourthly, students are spending most of their time

using year 1 and year 2 materials. It is likely this is for revision purposes to help prepare for the upcoming Junior Cycle state examination as material from earlier years may be less well remembered compared to that covered in the current academic year. Finally, we have been surprised to see that the majority of students (51%+) are accessing the system using desktop computers rather than mobile devices Tablets in particular at 10% is very low. We are unsure if this is an anomaly due to students working from home as a result of Covid-19 or if the desktop experience offers a richer learning environment? Perhaps when schools re-open students will use their mobiles more as they access the materials while travelling between school and home or tablets if using the system during class? Also will the same usage patterns and device preferences be replicated elsewhere as the other partners adapt and test out the system? All interesting questions.

IMPLICATIONS

Although it is still early days in the DALDIS project and there is a lot still to learn and research, some early implications for teachers, teacher education and professional development include the following:

1. eAssessment systems like Study Quest have an important role to play in enriching teaching and learning and encouraging independent learning.
2. AFL with its emphasis on formative assessment is a powerful pedagogic tool as it enables the teacher to see how students are developing and how to assist their progress (Shute, 2009).
3. Effective feedback is central to AFL and has been identified in research as one of the most powerful influences on student knowledge and achievement. eAssessment that can generate immediate student feedback motivates learning and has the potential to support new forms of teaching and learning, in particular blended learning.
4. Worldwide, as digital technologies in schools become more prevalent alongside developments in evidence based policy making, involving increased accountability and standards based curricula (Thompson, 2017), teachers are coming under increased pressure to use AFL and technology more. Because many teachers feel unprepared for these assessment demands (Herppich, Praetorius, Forster, Glogger-Frey, Karst, Leutner… Südkamp, 2018) assessment literacy practices and technology competency need to be incorporated into initial teacher education (ITE) and continuous professional development (CPD).
5. In addition to ITE and CPD, the implementation and adoption of AFL and eAssessement systems like Study Quest requires effective leadership and a supportive school culture. School leaders can assist teachers' assessment literacy development by allocating time to work on creating AFL material (Ní Chróinín & Cosgrave, 2013) and becoming familiar with different tools and systems; opportunities for staff to work collaboratively and develop communities of practice should also be provided (Birenbaum, Kimron, & Shilton, 2011; Kay & Knaack, 2009).

While the design of DALDIS predated Covid-19, the surge in usage once schools locked-down indicates that well designed digital platforms which map directly to the curriculum can be valuable learning and assessment tools once teachers adopt them. Although DALDIS is designing for six specific national curricula, and is still a proof of concept project, many technology based tools for formative assessment already exist for teaching and learning such as Socrative, Kahoot, Plickers and RecaP. They are generally similar in their core functionality in that they provide instantaneous feedback about students' understanding of topics just taught. Teachers may also be interested in the Learning by Questions (https://www.lbq.org/) platform which like DALDIS is also curriculum aligned and contains 60,000 question sets. Teachers wishing to design their own curriculum specific question-sets containing functionalities like Study Quest such as integrated reporting, individualised feedback and advanced grading options, should consider using a combination of Google forms and flubaroo (http://www.flubaroo.com/), a free application add-on.

FUTURE RESEARCH

The DALDIS project runs until 2022. During this time question-sets similar to those in JCQuest will be designed for each partner country in line with classroom teaching practices and national curricula. The systems' innovative features such as the use of feedback 'nudges' to help students learn, gamification and incentives and data analytics for providing insights on effective questioning and student progression will be tested and researched. Furthermore, through working with schools and teachers the different approaches to curriculum in STEM and MFL teaching will be documented, and the effective-

ness of AFL in these contexts will be researched. This will help to develop a cross-European perspective on the design and implementation of a digital Assessment for Learning solution that will work across different education systems.

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Equity Issues

How Do We Oppose Racist Zoombombs?: A Discriminatory Design Technology Audit

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The videoconferencing service Zoom saw tremendous growth during the COVID-19 pandemic as businesses, schools, and people turned to the service for emergency remote teaching and learning. However, the company quickly saw a backlash as racist, sexist, and vulgar Zoombombs; personal data leaks; and other security "glitches" were exposed. The authors use Benjamin's forms of discriminatory design to audit Zoom as an illustrative example for how technology specialists, administrators, teacher educators, teacher candidates, and students might interrogate technologies that can disproportionately harm vulnerable groups including minors and students of color. They conclude that Zoom's default settings serve as a form of default discrimination that should be considerered before adoption and they make recommendations for how educators might conduct similar discriminatory design technology audits of other educational technologies.

INTRODUCTION

The COVID-19 pandemic caused schools and universities to transition overnight to online education. The California videoconferencing company Zoom saw users rise from 10 to over 300 million as people, schools, and universities adopted the service or increased use (Warren, 2020). However, Zoom's popularity quickly exposed security failures that allowed for uninvited intruders to harass people, the sharing of personal data with Facebook and from LinkedIn, and false security claims about end to end encryption among other features (Newman, 2020). Default settings that prioritized ease of use allowed a multitude of problems including racist Zoombombs where Black people defending dissertations and reading picture books were targeted (Prude, 2020; Redden, 2020). Some school districts also ceased using the service after children were Zoombombed by intruders spewing racist, hateful, and vulgar content (Strauss, 2020). In response to criticism, Zoom changed many of the default settings (e.g., password requirement, waiting room) and added security, but why did they not prioritize security, safety, and privacy from the beginning?

We do not believe these failures should be viewed simply as fixable "glitches" or oversights, but as a window into a "move fast and break things" ethos of an industry that prioritizes profits over protection, leaving those most vulnerable groups of people exposed (Benjamin, 2019; Krutka, 2020). Zoom offers an illustrative example of discriminatory design that is common in Silicon Valley and edtech which educators—from teachers to teacher educators to technology specialists—should learn to identify so they may ensure technology adoption, use, and policies are just and equitable.

INNOVATION

In her 2019 book *Race After Technology*, Benjamin argued that a *New Jim Code* has emerged whereby new technologies are employed "that reflect and reproduce existing inequities but that are promoted and perceived as more objective or progressive than the discriminatory systems of a previous era" (pp. 5-6). For example, the popular classroom platform ClassDojo allows teachers to subjectively input data on students' classroom behaviors and the platform pumps out supposedly objective behavioral data on the other side. This is troubling both because of the history of exclusionary and discriminatory discipline against students of color (Simson, 2014) and the ways the technology shapes the behaviors and cultures of classrooms via behaviorist ideology. It does not matter whether the discriminatory design of learning technologies is implicit or explicit as harm results either way. Our larger critical inquiry is guided by the question (Crowley & King, 2018), *is this technology racist?*

Table 1
Benjamin's (2019) Forms of Discriminatory Design

Forms of Discriminatory Design	Description	Question	Example
Engineered Inequity	The design of technology is embedded with social biases.	Are social biases engineered into the technology?	Programs with algorithms that identify spelling and grammar "mistakes" can reinforce standard English (as well as White or Christian-sounding names; Benjamin, 2019; Caliskan et al, 2017) as the only legitimate dialect (or names) with likely no people in human resources to contact for recourse.
Default Discrimination	Default settings reveal designer priorities as "glitches" can be linked to broader discriminatory practices.	Do default settings allow for discrimination, particularly against more vulnerable groups?	Search results and advertisements on search engines used in schools like Google can return racist and sexist results, differentiate ads based on race, or spread White supremacist misinformation (Benjamin, 2019; Noble, 2017).
Coded Exposure	Technology is developed based on White norms or superiority that renders People of Color either less visible (e.g., photo technologies, webcams) or hypervisible (e.g., predictive crime algorithms).	Does the technology recognize or treat groups differently in ways that cause disproportionate harm to vulnerable groups?	Artificial intelligence and machine learning tools, such as Facial recognition technology and algorithms, deployed in schools are more likely to be used to surveil and (mis)identify students of color, leading to the continuation of racial inequity in discipline referrals. Furthermore, it is unclear whether students' privacy will be protected and who will have access to this data (Aguera y Arcas, et al., 2017; Herold, 2018).
Technological Benevolence	New technologies are pitched as objective tools to ameliorate social biases but instead reinforce and obfuscate biases.	Does the technology reinforce social biases even though it purports to fix problems?	School or college admissions algorithms designed to speed the admissions process could be biased if they are designed toward White or male norms, and as a result could downgrade women and people of color's applications.

We developed the four questions in Table 1 as initial questions technology specialists, administrators, teacher educators, teachers, teacher candidates, and K-12 students might use to audit the justness of technologies for making decisions about technology use, adoption, and policy. We generated these questions based on the work of Benjamin (2019), but believe they can be points of departure for interrogating technologies more broadly. Amrute (2019) contended that it is only by attuning to the concerns and experiences of those people most vulnerable to technologies that we can develop rules

of thumb for making technoethical decisions appropriate to the context. In teacher education, focusing on technoethics requires not just centering technology integration in courses, but foregrounding ethical issues that interrogate technologies before they are integrated into educational settings (Krutka, Heath, & Staudt Willet, 2019). We hope these questions are clear and fruitful (Kimmons, Graham, & West, 2020; Kuhn, 2013) and assist educators as they oppose not only racist Zoombombs but other manifestations of discriminatory design that can disproportionately impact the most vulnerable members of their classroom, program, and society. Preferably, teacher educators and decision-makers should ask alongside the students who are expected to use—and are used by—technologies.

RESULTS

To increase use of their product during the COVID-19 crisis, Zoom offered free use of their software for K-12 schools and touted itself as having "one consistent enterprise experience for all use cases" with a commitment "to safety, security and privacy for all Zoom users" (Zoom, 2020, n.p.). The initial design favored frictionless entrance to meetings that left Zoom's users vulnerable to exploitation by people who sought to cause harm to vulnerable groups through intentionally racist, sexist, and vulgar Zoombombs. The press coverage surrounding these hacks led the company to admit that this was a "mistake" while shifting blame onto the users for not "knowing" to enable security features that could prevent these intrusions (CBS News, 2020).

In economic terms, the response of Zoom to the problem is considered a *negative externality*, which refers to the cost imposed on third-parties such as school districts by activities related to the consumption of a service (Vagle, 2020). In this case, the general public, not Zoom, is paying the price of its security flaws in the form of unwanted exposure to Zoombombs. Zoom later updated their default settings to enable these security features (Peters, 2020). However, critics argued that Zoom should have reassessed security and privacy issues last year when a researcher discovered that attackers could activate a user's webcam without their authorization, and that Zoom secretively reinstalled its program if users removed the app from their computers (Singer, Perlroth, & Krolik, 2020). Zoom justified their decision to only offer encryption to paying customers so they can work with the FBI to monitor non-paying customers, thus resulting in privacy for those who can afford it and surveillance for those who cannot (Grant, 2020). In table 2, we share what an audit of Zoom could look like for educators as an illustrative example. In our assessment, Zoom would not pass a discriminatory design audit primarily due to their default settings. We believe technology specialists, teacher educators, and teacher candidates could then decide to either abandon the service, advocate for technological changes, or take some other action to protect educators and students using the technology in schools and society.

Table 2

Example of Discriminatory Design Technology Audit of Zoom

Forms of Discriminatory Design	Question	Possible Answer
Engineered Inequity	Are social biases engineered into the technology?	Yes, we identified some evidence of engineered inequity. Zoom only offers encryption for paying customers because they want to work with law enforcement to surveil non-paying customers for possible crimes (Grant, 2020). Educators might also interrogate emoji skin tone default settings and options further with students (see Carman, 2018, for more). In 2015, Apple and the tech industry adopted 5 skin tone emojis to better represent human diversity than was previously available. Zoom adopted these skin tones in their design (see below). These five skin tones have received both praise and criticism. While the default yellow skin tone setting is intended to be neutral, it has often been associated with White characters on shows like *The Simpsons* where darker skin tones are used for people of color.
Default Discrimination	Do default settings allow for discrimination, particularly against more vulnerable groups?	Yes, we found evidence of default discrimination. Zoom's initial default security settings left children, people of color, and other minoritized students vulnerable to racist, sexist, and vulgar Zoombombs. Numerous child protection laws have established that minors require additional safeguards. Minoritized children are doubly vulnerable as racist or sexist Zoombombs target them specifically with harassment that can cause additional psychological harm. Lax default settings left children and people of color exposed to psychosocial violence.
Coded Exposure	Does the technology recognize or treat groups differently in ways that cause disproportionate harm?	No, we did not find evidence of coded exposure in the technology. While we could find no literature speaking to Zoom not being able to detect darker skin tones, school districts should ensure that there are no issues with students of color using Zoom.
Technological Benevolence	Does the technology reinforce social biases even though it purports to fix problems?	Yes, we found evidence of technological benevolence. Zoom claimed they can provide, "modern learning for the modern student… (and) improve student outcomes" (Zoom, 2020). However, their vision of the "modern student" ignores that students have unequal Wifi and device access and conducting schooling through Zoom would only increase the digital divide and opportunity gaps for students of color, rural students, and students from lower socioeconomic groups. Moreover, differences in safety and security features based on account types could leave users with free versions more vulnerable to Zoombombs, sharing of their data, and the hacking of their webcams.

IMPLICATIONS

If educators had conducted such a Zoom audit prior to the COVID-19 pandemic, it is possible they could have influenced the company to redress their discriminatory design or turned to less harmful options. We therefore offer several interconnected recommendations for teacher educators to oppose not only racist Zoombombs, but other forms of discriminatory design in learning technologies. Our larger interrogation is guided by the question, *is this technology racist?* First, we recommend that teacher educators and candidates gain familiarity with the critical literature about technology and learning technologies, particularly from people, and women, of color. We relied on Ruha Benjamin's (2019) *Race*

After Technology book to deepen our understanding of discriminatory design. Teacher educators might assign her book—in whole or in part—to teacher candidates, but they might also identify shorter articles or her online talks. We included these resources and other related works authored by women in table 3 which teacher educators might study to inform their instruction, adoption, and approaches.

Table 3
Critical Sources Addressing Racism and Technology

Reference	Brief Summary
Benjamin, R. (2019). *Race after technology: Abolitionist tools for the New Jim Code*. John Wiley & Sons.	This 285 page book addresses the *New Jim Code* and discriminatory design in the past and present, and offers advice for addressing it in the future. Recommended for college level students, teacher educators, and in-service teachers.
Benjamin, R. (2019). Assessing risk, automating racism. *Science, 366*(6464), 421-422.	This two page article addresses how "coded inequity is perpetuated precisely because those who design and adopt [discriminatory] tools are not thinking carefully about systemic racism." She specifically discusses a health care algorithm that reflects racist biases. Recommended for undergraduate teacher candidates and in-service teachers, particularly in science education.
Benjamin, R. (2016). Incubate a better world in the minds & hearts of students [video]. International Society for Technology in Education. https://www.youtube.com/watch?v=9xmrJJESCt8	This 55 minute keynote talk from the 2016 International Society for Technology in Education (ISTE) is titled, "Set phasers to love me: Reimagining the default settings of technology & society." In her talk, Dr. Benjamin addressed problems of inequity and solutions for empowerment regarding technology. Recommended for undergraduate teacher candidates and in-service teachers, particularly in science education.
Browne, S. (2015). *Dark matters: On the surveillance of blackness*. Duke University Press.	This 224 page book addresses *racializing surveillance* and how current surveillance technologies are rooted in histories of racial discrimination. Recommended for college level students, teacher educators, and in-service teachers.
Broussard, M. (2018). *Artificial unintelligence: How computers misunderstand the world*. MIT Press.	This 248 page book addresses *technochauvism* and the limits of what society can and should do with technology. Recommended for college level students, teacher educators, and in-service teachers.
Eubanks, V. (2018). *Automating inequality: How high-tech tools profile, police, and punish the poor*. St. Martin's Press.	This 283 page book addresses the *digital poorhouse* and analyzes the impact that technology companies impose on poor and working-class people in the United States through data mining and other policies. Recommended for college level students, teacher educators, and in-service teachers.
Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism.* New York University Press.	This 245 page book addresses *algorithms of oppression* and *digital redlining* and challenges the notion of equality in search engines and information systems. Recommended for college level students, teacher educators, and in-service teachers.
Wachter-Boettcher, S. (2017). *Technically wrong: Sexist apps, biased algorithms, and other threats of toxic tech*. W.W. Norton & Company.	This 240 page book addresses *algorithmic inequity* and the biased design in many of the apps and other digital products that people use on a regular basis. Recommended for college level students, teacher educators, and in-service teachers.

As we detail in this paper, we offer a discriminatory design audit that teacher educators and candidates can explore when considering the use of technologies in schools. The following four questions offer a point of departure for class interrogations:

- Are social biases engineered into the technology?
- Do default settings allow for discrimination, particularly against more vulnerable groups?
- Does the technology recognize or treat groups differently in ways that cause disproportionate harm to vulnerable groups?
- Does the technology reinforce social biases even though it purports to fix problems?

Identifying bias in technologies or their application is not easy and teacher educators will be more informed if they have investigated sources like those from Table 3. Classes may explore learning technologies that are popular in schools, but that have been critiqued for technoethical problems, such as G Suite for Education (Lindh & Nolin, 2017), Class Dojo (Williamson, 2017), or interactive slavery or Indigenous historical simulations (Polletta & Cano, 2017). Once teacher educators and candidates complete audits then they should make choices about whether to use the technology or turn elsewhere. In the case of Zoom, educators might consider open-source videoconferencing alternatives such as Jitsi Meet (Laporte, 2020). Finally, teacher educators and candidates should engage in activism in their classrooms, colleges, or schools. Such activism may include inviting administrators or technology specialists to class to discuss discriminatory design concerns or to contact the company to request changes. As teacher candidates take on an active role not only as consumers, but justice-oriented citizens, they will hopefully develop a disposition of healthy technoskepticism toward their professional and personal uses of technology that transfers to other settings.

FUTURE RESEARCH

Scholars should conduct future research to better understand how discriminatory design can be researched, taught about, and mitigated at various levels. First, more research is needed to interrogate how discriminatory design impacts students. Second, we hope teacher educators might conduct and research audits like the one we present in this paper along with other critical technology approaches to help teacher candidates and K-12 students identify how technologies can extend or amplify social biases. Finally, educators should engage in participatory research projects to mitigate discriminatory design through activism at classroom, school, and societal levels. We believe conducting such audits can help educators avoid using technologies that might do harm.

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Emergency Closure in Education:
A Case for STEM Outreach Center's Afterschool Program

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Afterschool programs promote youth development and connect marginalized youth with social resources. As a result of COVID-19, New Mexico's Public Education Department (NMPED) closed for the rest of the academic year. In response to the needs of the community, the STEM Outreach Center (SOC) adopted a service delivery practice model that leverages human resources in-house and within the community, and restructured programming deliverables. In partnership with stakeholders, we implemented virtual and non-virtual solutions to ensure essential K-12 educational services are not compromised. By strengthening a broader online community, 21st-century technology skills have improved for all. For unforeseen emergencies in education, we suggest the integrity of a program to be kept while reframing context and working in tandem with the community.

INTRODUCTION

The SOC of New Mexico State University has the mandate to provide afterschool enrichment programs for K-12 public schools all year. Afterschool programs enhance youth development, academic performance, school bonding, decrease the risk associated with behavioral issues (Lester, Chow, & Melton, 2020), and provide a safe space for students to learn at the end of the school period. All programs that we provide are face-to-face, however, following COVID-19, NMPED closed for the rest of the academic year, calling for the restructuring of programs to continually provide education in this urgent situation (Kagawa, 2005). In-service teachers who facilitated the afterschool programs were tasked with finding new ways of completing unfinished programs at home. Brown (2011) discussed three broad stages of reactions during an educational emergency through responding, recovering, and renewing. The SOC used these approaches to maintain essential services for the community. We elaborate on how we maintained essential services in the following paragraphs.

INNOVATION

A key principle for education in situations of emergency and crisis is rapid response and using a community-based approach (Sinclair, 2001). Prompt response to the needs of the community with educational services provides practical support in the restoration and recovery process. Educational organization leaders and staff knowing the local community and network can create insightful and authentic responses by communicating and delivering their services.

During an emergency, local educational leaders adopting a "service delivery practice model" supporting children is critical in sustaining a sense of normality in the society (Brown, 2011, p. 86). Our service delivery practice model which met our contract obligations included:

Restoring a sense of "normalcy": Given the constraints of the inability to meet students face-to-face, SOC shifted to telework, secured the necessary student materials and supplies for remote learning. We used Zoom® (https://zoom.us/) – an innovative videoconferencing platform – for online communication within the staff and between staff and in-service teachers, we purchased our supplies from Amazon® (https://www.amazon.com/) – an online marketplace – using their two-day Prime shipping option due to the time constraint for faster delivery to in-service teachers and participating schools.

Creating a "catch-up" plan: To assist teachers with an easy transition to online education, SOC contributed to online resources and updated our website (https://stem.nmsu.edu/) to include educational and informative resources for teachers, students, and parents. Table 1 lists online resources SOC made available to families, teachers, and students on different platforms.

Table 1
Online Resources for Families, Students, and teachers

Resource Category	Link to Resources
Online resources for Families	https://stem.nmsu.edu/resources/family-resources/
Online resources for Students	https://stem.nmsu.edu/resources/student-resources/
Online resources for Teachers	https://stem.nmsu.edu/resources/teacher-resources/
YouTube® Channel for Educational Videos	STEM Outreach NMSU https://www.youtube.com/channel/UC6HE8os7oTFGKo2GLqCthIg/videos
60 Seconds TikTok® Educational Videos	TikTok handle: @stemoutreachnmsu

Leveraging resources with community partners: Community agents including Superintendents, Family Youth Incorporated, Nature Matters Academy, Ngage New Mexico, Cruces Creatives, La Semilla, and New Mexico Out-of-School Time Network partnered with program staff to continue offering free enrichment opportunities in safe, equitable learning environments for all students (See Table 2 for links to the partners' websites). Most importantly, these experiences complement the districts' distance learning plan and seek to maintain close relationships with all stakeholders. Leveraging resources has allowed districts to execute a solid plan that includes meal distribution, enrichment lessons with a different perspective to core lessons, and obtaining student materials and supplies for remote learning.

Table 2
Community Partners that SOC worked with

Community Agents	Link to Community Agents' Websites
Family Youth Incorporated	https://newmexico.networkofcare.org/mh/services/index.aspx
Nature Matters Academy	https://www.naturemattersacademy.com/?r_done=1
Cruces Creatives	https://www.crucescreatives.org/
Ngage New Mexico	http://www.ngagenm.org/
La Semilla	https://www.lasemillafoodcenter.org/
New Mexico Out-of-School Time Network	https://sharenm.org/new-mexico-out-of-school-time-network-nmost/new-mexico-out-of-school-time-network

RESULTS

During an emergency, the educational community experience substantial challenges in providing quality, accessible, and safe educational services to students because infrastructure and essential services are compromised (Seers, 2016). Studies have shown the benefits of community partnerships for afterschool programs (Huang et al., 2010). Nevertheless, we encountered setbacks in our effort to provide an inclusive community virtual afterschool programming. For example, some principals were not willing to continue the program because they felt teachers were too overwhelmed with the state-mandated efforts during "regular" school sessions.

Virtual results. Initially, the STEM Outreach Center's website (https://stem.nmsu.edu/) was updated to include online resources for families, students, and teachers. The website link was also included in the state/school websites to expand access. Additional communication in the form of eNewsletters was updated to include COVID-19 information, resources available in the state, technical assistance webinars, social-emotional learning, and other online resources. Afterschool programming continued virtually as an option for all participating schools. If the school principal decided to continue offering this experience, teachers had to commit to doing online enrichment lessons, outside of the regular school hours, with a minimum of two students. Teachers were encouraged to transform their typical afterschool session utilizing an online platform of their choice or explore doing a different session. If the school decided to participate in a virtual afterschool program, a daily documentation form was non-negotiable.

Non-virtual results. To ensure students had necessary supplies for regular-day and afterschool remote learning, SOC staff purchased, bagged, and distributed up to 200 supply bags at each state-sponsored meal distribution sites. In some instances, these supplies were shipped directly to the school, where a school staff member assembled the supply bags for each student. Program coordinators and community partners developed one-page flyers promoting enrichment activities around STEM, nature, and physical fitness topics; over 10,000 leaflets were distributed weekly at meal sites and will continue until the end of the semester.

During this emergency closure, we recognize that working together in partnership with stakeholders diminishes the state of panic in students, teachers, and parents because they feel supported. We attained a much more effective communication between teachers, administrators, and the community. Technological skills were not a requirement especially for parents because the afterschool programs provided support, for example, homework help, to students. As parents were tasked with assisting their children, it became evident that not everyone has the adequate technological skillset to maneuver emergency remote learning and telework, however, we identified an improvement in 21st-century technology skills among both parents and students. The SOC has also been able to broaden its online network. We are working together with the community to provide services to parents and students who might otherwise not qualify for our services because of grant restrictions.

The digital divide is evident when teachers and parents are forced to resort to technology for continuous progress. The central ideas for reconsidering the restoration and recovery process includes a) sharing responsibility between the community and afterschool programs and b) professional development that integrates technological training.

IMPLICATIONS

The implications presented below are in the context of afterschool programs for K-12 students with in-service teachers facilitating the program in their school and SOC staff coordinating those programs.

Create long term objective and contingency plans: Students can enter the mainstream academic process without delay or limitation when a contingency plan is in place which helps with preparedness and recovery (Patterson, Weil, & Patel, 2010). Although the university under which SOC works had contingency plans for emergency education, SOC did not have formalized contingency plans in this regard. We followed the protocol provided by the university and quickly created a "catch-up" plan to suit grant expectations. Therefore, we suggest that programs in this context have existing emergency plans.

Allow for flexibility: Donors and funders should make space for emergency scenarios to accommodate grant requirements and deliverables. We had the opportunity to broaden our service concept and reach a wider audience by reallocating funds and modifying program content.

Prioritize mental health: Mental health is a major concern during an emergency such as a pandemic (Holmes et al., 2020; Wang et al., 2020), therefore prioritizing students' mental health (for example, by including and engaging in yoga or other forms of exercises) as part of the curriculum becomes beneficial (Bilmez, & Aral, 2020). In addition, in-service teachers should be given the option of opting out of teaching without binding penalties to promote their overall wellness.

Address Inequality: Unequal access to technology, especially for low-income households, is a challenge for remote learning (Morgan, 2020). During professional development and curriculum design, we encourage staff and teachers to make provision for parents or students who lack access to or knowledge in using technology like teleconferencing tools and basic online search skills (Morgan, 2020).

Crises provide an opportunity for a positive change: Keep in mind that crises do not necessarily mean setback. It is rather a chance to evaluate your program and address potholes that are otherwise not visible. The SOC has developed better communication with superintendents and district staff.

FUTURE RESEARCH

SOC provides summer camps. We are currently preparing virtual curriculum content for summer camps and online professional development for facilitators. Replication focuses on identifying effective practices based on evidence of success in meeting the needs of the target population during an emergency. We intend to track student participation and interaction with selected online platforms.

Reframing context in a diverse community is a challenge. Still, it has potential benefits when we aim to maintain the integrity of afterschool programs and serve a diverse community in need. Designing and conducting quality early professional development for teachers and training for non-educator adults aiming for emergency preparedness, academic and behavioral improvements, teamwork commitment, and social inclusion is our next step for expansion and replication.

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Technology as Technocracy:
Educators' Conscientious Use of Technology for Authentic Family Engagement

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Pre-service and in-service teachers nationwide are asking the following questions: Could we have been more prepared? COVID-19 has made public and transparent the digital inequalities of today's schools, particularly for culturally and linguistically diverse (i.e., CLD) students and their families. How can technology be used in a proactive way regardless of context to identify and document both the technological needs and assets of students and their families beyond the question of who is or is not connected? This chapter encourages educators to shift their current technological pedagogical practices by exploring possible solutions that pull-in family biographies rather than follow prescribed virtual platforms and learning programs. Adopting a Freirean perspective, this chapter posits that pre-service teachers as well as in-service teachers should view the use of technology as a tool that serves as the equalizer between home and school if used in ways that are agentive and transformational.

Keywords: technology, family engagement, COVID-19, culturally and linguistically diverse, equity, teacher preparation programs.

INTRODUCTION

Nationally, schools have tended to assume that technology is the answer to reaching and teaching students amid the Covid-19 crisis, regardless of students' socioeconomic status, culture, home language, and grade level. Equally unexpected, has been the emergent reality that most pre-service teachers as well as in-service teachers are ill-prepared to: (a) proactively manage the transition from face-to-face to online instruction; (b) convert to curricula and instruction technologically suited to that transition (see CAEP and ISTE standards); and (c) develop alternate, especially formative assessments for the converted instruction of all students who should be participating. Especially vulnerable to this lack of readiness are culturally and linguistically diverse (CLD) populations, particularly English learners (EL), whose caregivers may not have the resources, skills, or educational experiences that are assumed by the school system in managing the crisis. This qualitative research project examined pre-service teachers' as well as in-service teachers' self-reported preparedness for such a crisis using a Freirian (1968) theoretical lens emphasizing critical consciousness, humanism, engagement, and collaboration.

INNOVATION

It has become evident that teacher preparation programs and professional development efforts are in dire need of a paradigm shift (Barr & Tagg, 1995). Our efforts toward preparing pre-service teachers and supporting in-service teachers

in the utilization of technology should be designed to embrace a learning paradigm deeply rooted in equity and inclusion. It is imperative that educators know how to create authentic relationships with the families they serve in order to equate equity with access when using technology (Herrera, Porter, & Barko-Alva, 2020). A formulaic approach to the use of technology in the classroom has never worked for vulnerable populations and certainly not in the crisis we find ourselves. Our efforts and preliminary data have indicated that we must be reflective on how to use technology through a conscientious lens (Freire, 1968) in order to move beyond our self-imposed pedagogical assumptions and limitations.

Using a thematic analysis (Braun & Clarke, 2006), these overarching themes have been identified in response to the authors' efforts to create equitable and sustainable practices that support students, families, pre-service and in-service teachers. Preliminary data were derived from 32 virtual professional development sessions and ongoing multilingual tutoring consultations serving approximately 15 families. Both initiatives were designed to increase the ongoing dialogue of conscientious pedagogy (Freire, 1968) as teachers transitioned to an online learning platform and homework packets.

With the best of intentions, challenges of limited access for the effective utilization of technology was identified across the nation, administrators and teachers' only recourse was to prepare pencil and paper packets of activities in order to ensure the most basic level of participation. Technology as defined by school districts was limited to tablets and computers. Few of these districts moved beyond technocratic one-size fits all strategies in order to broaden the possibilities of how technology could be defined when exploring at-home learning.

During the implementation of professional development sessions, it quickly became apparent that one-size fits all strategies failed to account for the diversity of the populations served in classrooms across the country. The discourse surrounding digital equity has shifted over the years. It is not so much about being connected, rather it is about the inequalities that exist for connected users (DiMaggio & Hargittai, 2001; Talaee & Noroozi, 2019; Vakil, 2018; Warschaur, 2006). In response, committees of literacy coaches, administrators and teachers came together to quickly prepare continuous learning activities for students in homes where technology was not accessible. Unintentionally, the learning of CLD students was relegated to rote memorization and non-cognitively demanding exercises. Additionally, no thought was given to families in the process of acquiring English. If students were not identified as ELs, there was no consideration for families' linguistic backgrounds; therefore, monolingual learning packets widened the equity gap by creating new challenges.

As COVID-19 and instructional responses became the norm, a faculty member and pre-service teachers entered into critical conversations that foster deeper understanding of how the sociocultural and linguistic needs of CLD families and students must be addressed during this time. As such, one of the authors created a *critical space* wherein multilingual pre-service teachers were able to ignite their own consciousness by reflecting on how to move beyond colonized or hegemonic notions of technology in order to transform learning practices that are equitable for all learners and families.

When CLD students and families were sent home with learning packets designed using language that was unfamiliar, a faculty member raised the consciousness of multilingual pre-service teachers by inviting them to become participatory agents in making content accessible to families. Through previously established community connections, pre-service teachers and a faculty member were able to identify what technology CLD families had access to. It became apparent that smartphones were their primary technological tool in order to access the internet and receive school information. CLD families would take pictures of specific pages, found in the learning packets, that were unclear (i.e., place value, number lines, fractions, homophones, making predictions and summarizing) to send to the tutor (i.e., multilingual pre-service teachers and one faculty member). The tutors, using the pictures sent by parents, worked to scaffold the academic activities for parents. Once parents understood the academic demands, they were able to teach the concepts to their children. Each tutor set up weekly office hours and parents called in, sent pictures, and worked with the tutor on reading, science, and math activities. When the learning packet required manipulatives or technology not found at home, the tutors would make every effort to identify available tools families already possessed in order to negotiate learning. This type of assistance could not have happened with a particular platform or program rather the conscientious effort to connect with families and individualize what type of support was needed while redefining what is considered a technological learning tool, (i.e., the smartphone), and how it was used to enhance interactional learning.

RESULTS

As we reach into the future, the intersectionality of teacher preparation, professional development efforts, the use of technology, and family engagement must be reconceptualized. Based on preliminary results, pre-service teachers and

in-service teachers became culturally and linguistically responsive to the dynamics of families, reconstructed the use of technology, and identified the type of technology families had access to in order to provide sustainable learning practices. These educators pointed out that this connection goes beyond creating lesson plans and instructional materials. Their support was anchored in the assets CLD families featured. The use of technology, while important, became the medium through which our pre-service teachers were able to identify what resources families were already negotiating. From PD sessions to tutoring sessions, we have learned the following:

Table 1
Preparing and Supporting Pre-service Teachers and In-service teachers

Issues	Implementation
Know your families	Educators should be able to identify which households have access to internet connection, nature and number of electronic devices. Educators should be able to create and have access to a biography driven as well as (Herrera, 2016) a family technology profile. Educators should be aware of current and up-to-date family information (i.e., current phone numbers and emails). Schools may not always have access to a viable contact number.
Technology Literacy	Educators should be aware that they need a holistic understanding of how parents are able to support their children when using technology. Throughout the year, multilingual workshops should have been set-up to scaffold and increase families' technology literacy.
Negotiating at-home-support	Educators should be able to identify resources they bring to their teacher preparation program and classrooms (i.e., multilingualism).

IMPLICATIONS

The nation's schools have responded to this current crisis in a technocratic manner of deferring to apps and links and/or creating packets for those without technology. The school system has missed the point thereby furthering fossilized practices (Herrera et al., 2020). Pathways for transformation must be anchored in the needs of the populations we serve. Yet, as COVID-19 has revealed, the disconnect between schools and families is vast. It is time to recognize that the educational system has, despite good intentions, failed families, particularly CLD families and vulnerable populations, in creating authentic, humble, and equitable partnerships. Much like the phrase *digital divide, family engagement* is a term that is often over-simplified and not given adequate attention in the development of each child. Professional development efforts should be purposely tailored to support in-service teachers as they address these inequities.

Teacher preparation programs have approached family engagement in a fragmented manner, at best. Often pre-service teachers' first exposure to families is when they are preparing for their first Back-to-School night or parent-teacher conference. This needs to change. The heightened consciousness and prioritization of family engagement must begin with pre-service teacher preparation programs. Due to this crisis and the times in which we live, online learning will only continue to grow. For these pre-service teachers, who participated in the consultations, a shift occurred that provided more intention in how relationships must navigate the usage of technology. Further, it challenged traditional notions of what is technology beyond a computer or tablet emphasizing the possibilities of a phone. Yet, the phone wasn't used to simply gain access to apps or programs. Rather, this piece of "technology" became the conduit for communication, collaboration and meaningful learning.

FUTURE RESEARCH

The preliminary findings of this research study indicate that the current crisis has exposed uncritically analyzed assumptions about students, technology, and families. In particular, future research should not assume that face-to-face to online conversions are solely an issue of transcending the digital divide. Additionally, it should be expanded to include families, especially those that are CLD, and deeper explorations into factors that aid those families in face-to-face to online transitions and maximizing the latter. Research involving teachers, on the other hand, should explore promising ways to better prepare pre-service teachers and in-service teachers for closer and more purposive collaborations with CLD families, especially amid crisis, such as COVID-19.

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Physical Literacy for Communities: A Multi-Sectoral Approach and Response to the Physical Literacy Needs and Capacities of Teachers, Schools, and Students During Covid-19

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Current guidelines around staying home and social distancing during the global COVID-19 pandemic are having significant impacts children's physical literacy opportunities and development, a key component of the Health and Physical Education (HPE) curriculum in British Columbia. This chapter explains how a community-based multi-sectoral working group, bringing together stakeholders from the areas of education, health, recreation, sport, and media, supported the implementation of COVID-19 physical literacy initiatives for teachers and schools. The chapter concludes with an exploration of how the initiatives stemming from this COVID-19 response will build on current knowledge and inform theory and practices in the HPE learning area.

INTRODUCTION

In the 2018 report *Let's Get Moving,* Physical Literacy was identified as one of the five principles that are foundational to increasing physical activity and reducing sedentary living for Canadians (Public Health Agency of Canada). Physical literacy is broadly understood as the "motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for engagement in physical activities for life" (International Physical Literacy Association, 2014), and is widely understood as the basis for sustaining the health of individuals (Cariney et al., 2019; Gately, 2010; Jeffries et al., 2019) and reducing burdens on health care systems (Tremblay, 2012).

Schools have been identified as key places to develop and support children's physical literacy. Yet, elementary school teachers in BC are currently not required to undertake any courses related to physical literacy, physical education, or physical activity (Province of British Columbia, n.d.). This has resulted in significant gaps in the ability of teachers to support children in their physical literacy development in educational settings. Equipping teachers with the skills and knowledge required to support children's physical literacy development is an essential part of making schools spaces that support children's physical literacy (Buckler & Bredin, 2018; Dinham & Williams, 2019; Edwards et al., 2019). To address this gap, a community-based multi-sectoral working group was established to support the physical literacy development of individuals throughout the community. This paper focuses on the efforts of this multi-sectoral working group as it relates to schools, teaching, and teacher education during COVID-19.

INNOVATION

The community-based multi-sectoral working group called Physical Literacy for Communities (PL4C) was created to bring together the community's education (K-12 & Post-secondary), recreation, sport, health, and media sectors to support families, schools, and communities. Our PL4C community meets on a monthly basis to discuss our sectors and

organization's work in relation to physical literacy, and identify ways to collaborate, build upon, and support our work across disciplines, organizations, and sectors. Within the education sector the PL4C community also acts as an important form of feedback and communication between the early years (birth-to-five), K-12 and post-secondary systems in relation to teacher training, professional development, and educational research. The challenges facing schools and teachers during COVID-19 have been a key focus for the PL4C community. In response to identified challenges, a series of initiatives were developed and supported by the PL4C community.

One of these initiatives is a collaboration between the K-12 and post-secondary systems to support the development of in-service and pre-service teachers in the area of physical literacy as some teachers and students return to schools to being in Fall 2020. To do this, a collaborative research project between the school district and the teacher education program within the PL4C community was created with two key aims: (1) build school based physical literacy capacity and knowledge; and (2) offer opportunities for pre-service teachers to engage in work integrated learning experiences during a time of remote delivery of university courses. Supported by faculty in the school of education and childhood studies and human kinetics, pre-service teachers will work with in-service teachers to develop physical literacy assessment protocols and collect data on children's literacy development to inform teaching practice. Additionally, pre-service teachers will be developing resources for in-service teachers as part of an in-service teacher mentorship program led by faculty.

Another initiative to support teachers and schools during school closures that came from the PL4C is a suite of online resources led by the Canadian Sport for Life Society in partnership with other PL4C members and broader provincial and national partners. A suite of resources entitled 'Physical Literacy at Home" was created in response to challenges in-service teachers were facing in addressing the HPE curriculum during school closures and for parents/guardians at home trying to keep children active. These resources can be found at https://sportforlife.ca/facing-covid-19-together/

Finally, challenges surrounding a lack of equipment to support physical literacy for children and families at home and those attending emergency childcare in schools was also identified as a key challenge facing teachers trying to address HPE curricular outcomes. To address this issue, PL4C partners from sport and recreation organizations and the city in which the PL4C is situated made equipment available and a distribution network was facilitated through the PL4C allowing for materials to be disseminated in areas of need.

RESULTS

Since the implementation of these initiatives in our community in the last month, PL4C members have met to discuss the impacts of the combined response. The "Physical Literacy at Home" resources have received over 2000 separate views in the last month, with views are increasing daily, suggesting that these tools are making an impact on children's physical literacy in our community. The collaborative research project has also received substantive interest from teachers within the school district and expressions of interest from pre-service teachers who wish to be involved in work integrated learning opportunities set to move ahead in September 2020. The PL4C community has also received substantive feedback about how the physical literacy equipment made available to children and emergency childcare spaces has supported and facilitated further physical literacy opportunities for children and families.

IMPLICATIONS

Given the significant impacts COVID-19 is having on children and their ability to move and play freely outside of the home, opportunities for children to engage in gross motor play and physical activity should be a key focus for schools as they reopen to students (Fane, 2020; Hyndman, 2017). Despite the growing body of evidence that speaks to the positive physical and mental health outcomes associated with children's physical literacy development (Cairney et al., 2018; Jefferies et al., 2019; Roetert, 2017; Buckler, 2018), supporting children's physical literacy development remains a challenge for teachers and schools due to the longstanding devaluation of health and physical education in schools. As most elementary school teachers in our community and Province are not well equipped to engage children in physical literacy learning and development, the PL4C community can offer schools, in-service teachers, and pre-service teachers opportunities, resources, professional development, and mentorship to address these limitations.

The PL4C community's response to the physical literacy needs of in-service and pre-service teachers during school closures and remote learning at the university also demonstrates the capacity of a multi-sectoral working group to respond quickly and effectively to community need.

Research and development in the areas of physical education and physical literacy have been slower than other curricular areas (Ha, 2008), despite mentorship in physical education having long been recognised as an evidenced-based model for developing teacher/educator knowledge, practice, and attitudes towards teaching (Kell, & Forsberg, 2014). This is especially true for new teachers and pre-services teachers, or those working with new subject areas or content (McCaughtry et al. 2005). Given the challenges of equipping in-service and pre-service teachers with the skills, knowledge, and confidence needed to support children's physical literacy development, the PL4C offered a unique opportunity for researchers and faculty in the areas of teacher education and physical literacy to work with the K-12 sector to identify opportunities for research and mentorship to increase out understanding of teaching and learning within the HPE curriculum.

Establishing a multi-sectoral working group in an area of focus identified by schools, school districts, and teacher education programs can be an effective way of supporting in-service and pre-service teachers, children, families, and the broader community using a strengths-based approach to community, institutional knowledge, and inter-sectoral capacity.

FUTURE RESEARCH

As schools in BC offer an optional re-opening in June 2020 for students who wish to attend, the PL4C community will continue to support in-service teachers with the development of on-line physical literacy content to be used in schools or accessed at home for children who will not attend school until September. As the collaborative research project begins in the upcoming school year, further knowledge about the impact of COVID-19 on children's physical literacy development and the effectiveness of a mentorship approach to in-service and pre-service teacher development will further inform knowledge, theory and practice in the HPE learning area.

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Multimodal Reflections on Teaching Experiences

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This article describes a project where in-service teachers, enrolled in two different courses in a Masters program, were asked to reflect on action and for action about teaching during COVID-19. The reflective prompts required both written and multimodal responses on the topics. Results indicated that the directions and rubrics for the assignment impacted the use of multimodality in reflections as the two courses were given different information. Multimodal reflections occurred in 55% of total entries but with those where there was a clear expectation for this type of response it was 69% of the entries compared to 40% of the other group.

INTRODUCTION

Dewey (1933) described reflective thought as "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and further conclusions to which it tends" (p. 6). Schön (1983) outlines situations for reflective practice: *reflection in action,* and *reflection on action*. Reflection in action occurs during the teaching event, while reflection on action happens after the teaching event has transpired (Schön, 1983). Further, the idea of *reflection for action* exists, which involves the planning in preparation for future opportunities (van Manen, 1991). Reflection plays a critical role in teacher education in learning from experiences (Jay & Johnson, 2002). While reflection generally occurs through language, it can involve various modes (i.e., visual, kinesthetic, and tactile) (Costa & Kallick, 2008).

Multimodality focuses on the idea that meaning is developed, shared, received, interpreted, and redesigned though many modes (i.e., visual, spatial, gestural, audio, language), (Kress & Jewitt, 2003). From a multimodal perspective, all modes may contribute equally to meaning; language is not given preference in a multimodal approach (Jewitt, 2008). Multimodality allows creators to consider how to select and use a range of representational and communicational resources to share their understanding (Jewitt, 2008). While the body of research on both reflection and multimodality is extensive, there is little work on the integration of these two perspectives. In this article, I describe a project implemented with in-service teachers completing a Masters degree where they used multimodality to reflect on their teaching.

INNOVATION

The need for this project arose because of the K-12 school closures impacted my students' ability to complete assignments. I encountered Gorosave's (2020) reflection prompts through a colleague. This was developed for middle school students as an outlet to "express their feelings and fears. I was/am very concerned for their social-emotional well-being, and this was an easy way for me to connect with them. I tried to vary the daily journal topics to alleviate boredom and give them a new perspective each day" (T. Gorosave, personal communication, April 18, 2020).

I augmented Gorosave's (2020) prompts to include ones that asked teachers to reflect on action and for action (Schön, 1983; van Manen, 1991). The prompts encouraged in-service teachers to engage in reflection on action in their distance learning as well as reflecting for action in considering resources available to them as well as possible changes in their future teaching. There were some additional prompts that encouraged reflecting on the overall situation surrounding COVID-19. See Appendix A and B for the prompts, which are also available here-https://drive.google.com/open?id=13 qYezox9GHrWTy2c2tP50RhxUZkztxRb. I chose to encourage a multimodal perspective by asking students to include visuals and make decisions about the lay out of their reflections, using multiple modes of communication.

The project was developed first for an emergent literacy course where five in-service teachers engaged in the project. Of the five, three students allowed me to share their work. After I created the project for my course, I needed to replace a project for three students completing their Masters portfolio (see Table 1).

Table 1
Participants

	Course Completed	Teaching Position
Student A	Masters Portfolio	Third Grade Teacher
Student B	Masters Portfolio	Kindergarten Teacher
Student C	Masters Portfolio	Preschool- Laid off due to COVID-19
Student D	Emergent Literacy Course	Teaching Assistant- Eighth grade (Certified Grades 1-6)
Student E	Emergent Literacy Course	Substitute Teacher- Laid off due to COVID-19 (Certified Grades 1-6)
Student F	Emergent Literacy Course	Preschool Teacher

RESULTS

I conducted descriptive statistics for each reflective prompt. I first identified how the prompt directed students to respond (i.e., written or multimodal). Of the 14 prompts, 64% directed a written reflection while 33% directed a multimodal reflection. I then conducted frequency counts and calculated percentages of how the students responded to the prompts. My initial review of the 84 total entries from the six students identified that the multimodal reflections occurred for 55% of the submissions while 45% were written reflections. As I completed these calculations I noticed that there was a difference in responses between the two groups of students (see Figure 1).

	Week 1 Class Project	Week 1 Portfolio	Week 2 Class Project	Week 2 Portfolio	Total Class Project	Total Portfolio
Written Reflections	29%	48%	33%	71%	31%	60%
Multimodal Reflections	71%	52%	67%	29%	69%	40%
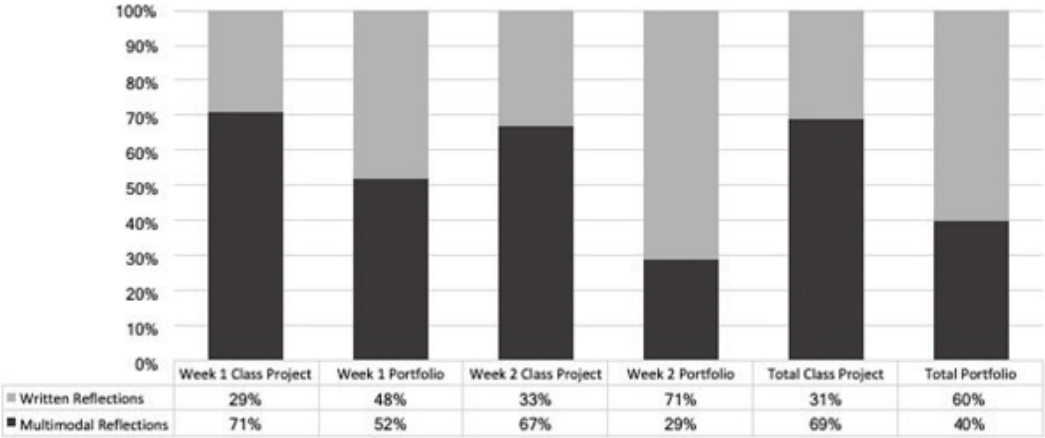
Figure 1. Comparison of Multimodal and Written Reflections by Class Project and Portfolio Assignments.
The chart displays the percentages comparing multimodal and written reflective entries between the two groups of students for each week and in total.

The class project group wrote more multimodal reflections (29/42 or 69%), even when the prompt did not specify a multimodal response. This group of students wrote 31% exclusively written reflections. In the first week 71% of the reflection entries were multimodal while 67% were in the second week. The portfolio project students wrote more written reflections following the prompts closely (25/42 or 60%). In the first week, their entries were 52% multimodal while in the second week this was 29% of the entries.

I reviewed my directions and rubric (available in the link to Google Drive) for the course project and determined I was more specific in my expectations for multimodal reflections. The rubric stated for full credit, "Project includes evidence of in-depth analysis, critical thinking, and reflection of the current circumstances and the impacts on teaching and learning. Write-up demonstrates thoughtful consideration of key aspects of teaching and learning and the challenges being faced as well as any successes student is experiencing. Slides include detailed writing as well as pictures, screenshots, or other information to support the reflection."

With the portfolio project, I did not specifically encourage multimodality when I introduced the project through email and the rubric for the assignment was already developed for written reflections. This, along with my phrasing of the prompts and the directions that did not encourage multimodality, led to the high number of written reflections I received. Examples of the written reflections are in Figures 2 and 3 while multimodal reflections are in Figures 4 and 5.
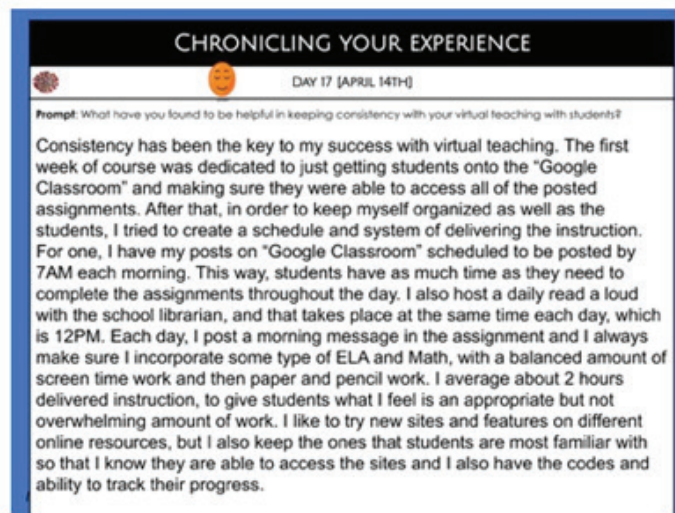
Figure 2. *Written Reflection- Student A.*
Prompt: "What have you found to be helpful in keeping consistency with your virtual teaching with students?"

Figure 3. *Written Reflection- Student B.*
Prompt- "How has this week been for you? What routines have become your new normal? What things did you take for granted before that you now miss?
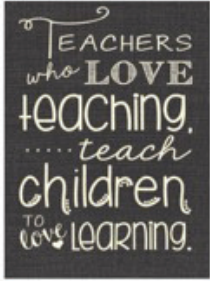
Figure 4. *Multimodal Reflection- Student E.*
Prompt- "Compile a list of quotes that represent this time, that inspire you, or that you simply like."

Figure 5. *Multimodal Reflection- Student F.*
Prompt- "Compile memes, photos, or other visuals about teaching and learning during Covid-19 pandemic. Reflect on what you've found."

IMPLICATIONS

Early results indicated that the format of the prompts, assignment, and directions allowed my students an opportunity to reflect on action and for action (Schön, 1983; van Manen, 1991) during the switch to distance learning. Further, early results indicated that there is potential as teacher educators for a deepened understanding of pre-service and in-service teacher experiences through multimodal reflection. While I have engaged students in multimodality in my courses, I have not explicated information about this theory, which I feel impacted student response with the reflective prompts. One further consideration is determining how to phrase and develop assignments to encourage multimodality. I will discuss each point further.

Students used the provided prompts to describe and analyze their experiences and consider how these would influence their future teaching. Given the role reflection plays in teacher education (Jay & Johnson, 2002), engaging in-service teachers in the opportunity to reflect on and for action is important. Developing prompts that specifically encourage reflection on and for action will be helpful for anyone working with pre-service and in-service teachers.

While I regularly engage in-service teachers in reflection, this has not been a multimodal experience. The connection between written and other modes of communication through their journal entries allowed me to glimpse further into their understanding of the situation and their experiences. I would encourage teacher educators to provide opportunities for pre-service and in-service teachers to use multimodality in reflections through course assignments, portfolios, or practicum/internship work.

An additional implication regarding multimodal reflections was my students' lack of knowledge about the theories of multimodality. Introducing multimodality before asking students to use multiple modes in their communication processes is important and a step that should be taken before encouraging multimodal reflections. An understanding of how multiple modes can work in conjunction with one another will help pre-service and in-service teachers consider how to develop a multimodal ensemble that communicates their experience.

While I was hoping to encourage multimodal reflection across all students engaged in this project, I recognize that the phrasing of my prompts as well as my directions impacted the preponderance of written reflections I received from one group. In developing future opportunities for students to reflect on their experiences, a critical component would be to carefully craft prompts and directions to encourage multimodal reflections. Further, while this project was focused on the context of COVID-19, the concept of reflecting on and for action through multimodal communication could be used in a variety of ways.

FUTURE RESEARCH

Given that multimodality can be a powerful tool in curriculum development and planning for instruction (Jewitt, 2008), the idea of multimodal reflections is something that can be explored further with pre-service and in-service teachers. Looking at how a teacher educator introduces the theory of multimodality to students and then how this information is reflected in their work would be an interesting perspective. Further, analyzing the content of the multimodal reflections would be useful to identify and describe the levels of reflection present in what teachers wrote (Jay & Johnson, 2002), the information shared about their reflections on action and for action (Schön, 1983; van Manen, 1991), and how they used multimodality to convey their experiences (Jewitt, 2008).
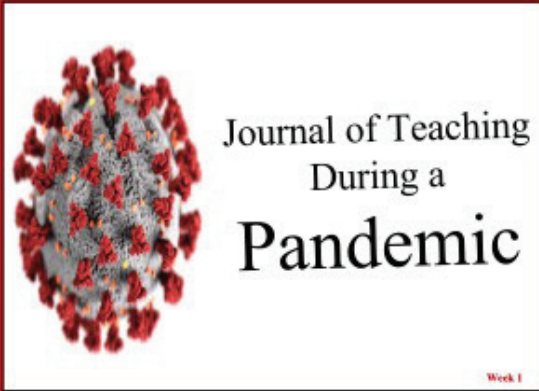
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Week 1 Prompts

Chronicling your experience

DAY 4- ENTER DATE

Prompt: Continue to find other ways that authors, illustrators, arts organization, etc… have been supporting the need for home schooling or supporting learning at home. Describe, take screenshots of what's being offered and reflect on what you've found.

Mood Tracker: (choose one)

Chronicling your experience

DAY 6- ENTER DATe

Prompt: Compile a list of photographs representing teaching and life during the Covid-19 pandemic. Reflect on your findings.

Mood Tracker: (choose one)

Chronicling your experience

DAy 5- Enter Date

Prompt: Compile a list of headlines from newspapers, journals, or other reliable media sources concerning Covid-19. Include local, state, nation, and world news headlines. How do you feel about how different areas are treating / responding to this pandemic? Are people overreacting or underreacting?

Mood Tracker: (choose one)

Chronicling your experience

DAY 7- Enter Date

Prompt: What are five things you wish you could do right now that you are unable to do because of the Covid-19 pandemic. Reflect on your feelings about this situation.

Mood Tracker: (choose one)

APPENDIX B

Week 2 Prompts

Chronicling your experience

Day 11 [enter date]

Prompt: Compile memes, photos, or other visuals about teaching and learning during Covid-19 pandemic. Reflect on what you've found.

Mood Tracker: (choose one)

Chronicling your experience

Day 13 [enter date]

Prompt: Having been out of school for multiple weeks now, how do you feel this experience will change you as a teacher when you return to the classroom? Has your thinking about teaching and learning changed since all of this began? How might you adjust and change your classroom in the future based on what you have experienced?

Mood Tracker: (choose one)

Chronicling your experience

Day 12 [enter date]

Prompt: List and describe at least three POSITIVE things in your life, community, nation, and/or the world you have noticed since this pandemic has changed normal everyday life and routines.

Mood Tracker: (choose one)

Chronicling your experience

Day 14 [enter date]

Prompt: Reflections. How has this week been for you? What routines have become your new normal? What things did you take for granted before that you now miss?

Mood Tracker: (choose one)

Online Assistive Technology Professional Development for In-Service Teachers

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Providing effective and engaging online professional development is critical in preparing educators to support students use of assistive technology. This chapter presents an overview of a voluntary, online professional development offering led by a team of assistive technology specialists in response to educators needs for PD during the COVID-19 pandemic. Descriptions of how sessions were designed and facilitated are explored along with a list of online resources and complimentary software downloads and trial versions that are available for the remainder of the school year.

INTRODUCTION

As a previous assistive technology (AT) specialist and current doctoral candidate in Exceptional Education, I am keenly aware of the need to provide engaging and current professional development (PD) for in-service teachers. Needless to say, I did not hesitate when my previous AT colleagues contacted me to collaborate on weekly online AT professional development sessions for in-service teachers during the COVID-19 pandemic. My AT colleagues shared that many teachers felt overwhelmed on how to support the AT needs of their students and socially disconnected from colleagues. Our aim was to address this need through the creation of several personalized online PD sessions to help overcome feelings of isolation, create networks of support among educators (Rodesiler & Pace, 2015) and provide relevant AT support.

This work operates under the guidance of the authentic e-learning framework (Herrington, Reeves, & Oliver, 2010). Authentic learning occurs when learners are participating in creative and relevant tasks that are embedded in various collaborative situations (Herrington et al., 2010). This framework was introduced to provide guidelines for converting the pedagogical components of authentic learning to the online environment (Teras & Kartoglu, 2017). This framework consists of nine elements: (a) authentic context, (b) authentic tasks, (c) access to expert performances and modelling, (d) promotion of multiple perspectives, (e) collaborative construction of knowledge, (f) reflection, (g) articulation, (h) coaching and scaffolding, (i) and authentic assessment.

INNOVATION

Weekly sessions were designed to provide training on specific AT software programs, along with live demonstrations and Q&A sessions. Weekly topics were based on teacher suggestions and student needs. The following weekly topics have been covered: (a) Introduction to Co:Writer (for all grade level teachers), (b) Co:Writer at home (elementary, middle, and high school sessions), (c) Clicker at home (elementary session), and (d) Boardmaker at home (elementary session). Each session is scheduled for two hours and is organized into six segments: (a) introductions, (b) overview and agenda, (c) modeling, (d) participant time to practice, and (e) question & answer/discussion session and (f) participant reflections. Email notifications describing the training session and the corresponding Zoom link were sent to all teachers in the school district. In addition, the AT team developed a website specifically for these weekly seminars that allows for video postings of the sessions, an area for comments/feedback as well as the option for teachers to create and maintain a blog of their experiences.

Introduction to Co:Writer

Co:Writer is a support tool that allows students to use customized word prediction and speech recognition to better express their written ideas. Please note the Don Johnston company (the creator of Co:Writer) is providing free access during school closures for practitioners (includes teachers, occupational therapists, speech & language pathologists, and physiotherapists). You may request access at: learningtools.donjohnston.com/accesstoelearning.

Access the following site for eLearning resources for Co:Writer: learningtools.donjohnston.com/support/product-resources/. Two introductory sessions were offered whereby one focused on accessing Co:Writer with the Chrome Extension and the other with the iOS App. Using the above mentioned link, navigate to: Co:Writer Resources and select the Learning Academy link.

The Chrome Extension session covered the following: How to change speech, font and color settings, how to add and remove personal words, how to create topic dictionaries from current page and from text, and how to turn topic dictionaries on and off. The iOS app session covered how to change text to speech settings, how to export and share writing, and how to use the Co:Writer keyboard in other applications. Please note video tutorials are available on the website for each topic covered.

Co:Writer at home

The session designed for elementary teachers covered the use of Co:Writer within Google docs to support creative writing exercises (journal entry, story starters and email composition). Teachers were taught how to create specific topic dictionaries related to curriculum and personal interests of the students. The session designed for middle school teachers covered the use of Co:Writer within graphic organizer software (Kidspiration), the use of Google docs when completing creative and historical writing along with composing email messages. The high school session primarily focused on the use of Co:Writer to support writing of research papers and essays. During each session, the Chrome Extension and the iOS app were both covered to highlight how Co:Writer can be used on various devices.

Clicker at home

Clicker (Crick Software) is an educational software program that provides students with highly customizable levels of support for writing. Crick software is offering free access to Clicker at Home for students and teachers during the COVID-19 pandemic and can be downloaded: cricksoft.com/us/clicker/clicker-at-home. Numerous video tutorials are available at the following site: cricksoft.com/us/training/clicker/clicker-8/tutorials. In our weekly session, we focused on providing an overview of the program with an emphasis on the Learning Grids feature within the program. Learning Grids offers thousands of pre-made Clicker activities that includes the ability to search for specific content. A wide variety of activities are available that include sentence sets for young children beginning to learn to write as well as word banks for more independent writers. In addition, we also covered how to create and edit sentence sets, connect sets, and word banks.

Boardmaker at home

Boardmaker (Activities-to-Go) is a platform that provides thousands of pre-made activities and symbols to support communication and literacy needs. Boardmaker Online is available for a 90 day free trial during the Covid-19 Pandemic. This will allow access to over 65,000 templates and activities: goboardmaker.com/pages/activities-to-go. The Learning & Support tab on the website offers access to a video library and recorded webinars. Our weekly session focused on navigating Boardmaker Online, accessing Boardmaker Activities to go and creating activities from blank and print templates. Video tutorials for all three of these topics can be found in the Teachers' Lounge tab (located under Learning & Support) on the website.

Table 1

Summary of PD Sessions

Software Program	Websites for Downloads & Resources	Topics for PD Session
Co:Writer	Request access: learningtools.donjohnston.com/accesstoelearning Learning Resources: learningtools.donjohnston.com/support/product-resources	Settings (speech, font, color), topic dictionaries. iOS: export & share writing, using Co:Writer keyboard in other applications. Using Co:Writer with Google docs & graphic organizers.
Clicker	Download: cricksoft.com/us/clicker/clicker-at-home Learning Resources: cricksoft.com/us/training/clicker/clicker-8/tutorials	Learning Grids Create & edit sentence sets, connect sets, and word banks.
Boardmaker	Download and Learning Resources: goboardmaker.com/pages/activities-to-go	Boardmaker online Accessing activities to go Creating activities from blank and print templates.
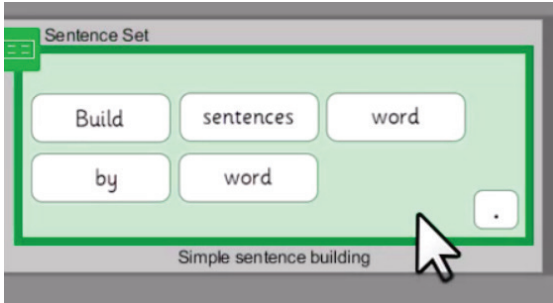
How to Create and Edit Sentence Sets (PD resource)

A sentence set consists of a number of grids that allow students to write sentences.
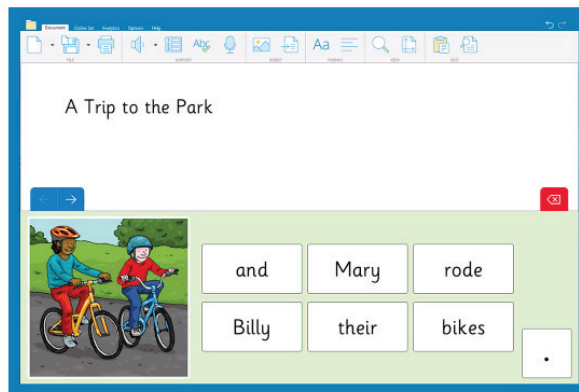
Within Clicker follow these steps to create & edit a sentence set:

1. Select Clicker Set- New-

2. Select Sentence Set:

3. Type or paste sentences in text box

4. Select OK

5. You can add a model sentence for each set. You can choose: *View & Copy, View & Remember or Listen.*
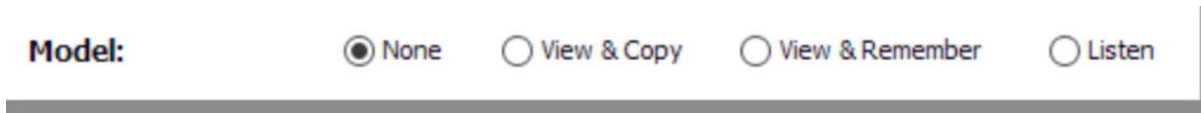
6. View & Copy: allows students to see the model sentence as they write the sentence.

   View & Remember: when students click on the 'eye' icon they are able to see the model; however the grid is not

   available until the model is closed.

   Listen: students can hear the sentence when they click on the speaker icon.
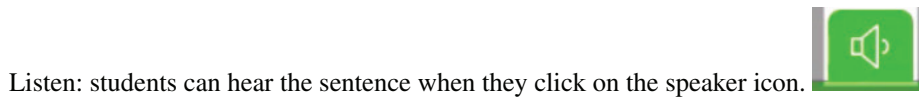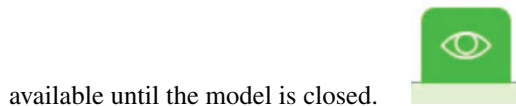
7. To add pictures to the grids: Go to Edit mode: .

   Select: . You can add your own pictures or use the Crickpix images.
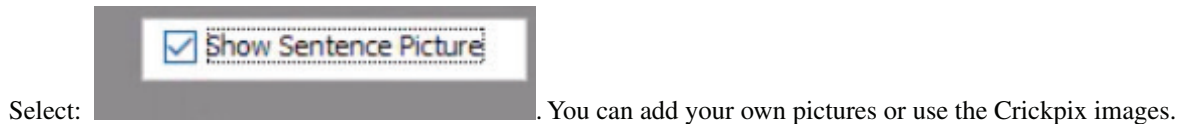
8. Select Go to practice using your new sentence set!

9. To save: Select Clicker Set and SAVE.

Figure 1. Sample PD resource for Clicker software.

RESULTS

The implementation of this online PD to support in-service teachers in their use of assistive technology has highlighted the importance of crafting PD to promote active learning among participants. By incorporating and promoting reflection along with constructive dialogue, many teachers shared they enjoyed the collaborative nature of the sessions, and participation offered a safe place to ask questions, brainstorm and feel supported. Educators need to participate in group discussions and be supported by experts in order to engage fully with content presented online (Prestridge & Tondeur, 2015). Educators also shared that these sessions provided a social outlet for professional discussions and an opportunity to learn from their peers. Participants shared they often felt out of their comfort zone which in turn may have led to further reflective exercises (Jensen, Tuten, & Eldridge, 2010). The importance of challenging participants' current skillset and knowledge is crucial in fostering an online environment that will facilitate growth and learning (Philipsen, Tondeur, McKenney, & Zhu, 2019).

IMPLICATIONS

My involvement in this PD underlined the need for educators/previous educators to take the lead in the design and implementation. The design of online PD must be geared toward the needs of teachers as most top down approaches

to PD are less effective and viewed as irrelevant to the current challenges teachers face in the classroom (Timperly & Alton-Lee, 2008). Educators are better able to connect with online assistive technology PD when it is practice-focused, whereby the sessions are designed to use real world tasks or activities that offer participants the ability to connect to their own professional practice (Brooks & Gibson, 2012). During each session, we incorporated ideas on how to cover specific grade level curriculum outcomes or how to target a potential goal from a mock students' individual program plan using the AT programs. In addition, the significance of embedding opportunities for all participants to share concerns and provide input for future sessions was obvious as rapport between the AT team and teachers continued to strengthen. This reciprocal process of open communication validates participants and enhances confidence (Rodesiler, 2017). Furthermore, participatory online PD has shown to be more effective due to the focus on a specific topic, an understanding of teacher beliefs and numerous opportunities for active engagement (Desimone, 2009).

Feedback from participants also reiterated the importance of providing access to a video library of the sessions. This proved to be an excellent reference tool for many participants as they could view the demonstrations and modeling of the software when it suited their schedules. The flexibility of providing learning experiences that gave participants choices, the ability to customize and space to reflect helps to ensure online PD is relevant, thought provoking and engaging (Brooks & Gibson, 2012). The provision of a video library and an online community of practice appeal to teachers as they are all social experiences and align with many social learning theories (Parsons, Hutchinson, Hall, Parsons, Ives, & Leggett, 2019).

FUTURE RESEARCH

Additional research will include the expansion of this PD throughout the school year along with the distribution of a survey to gather long-term results on teachers perceptions. Future research may also include an investigation into the effectiveness of utilizing this PD to teach pre-service teachers assistive technology within teacher preparation programs. Recommendations for others who wish to replicate this PD would include the need to take a personalized approach and avoid the temptation to cover every feature of the software programs highlighted in this chapter. By providing modelling examples that are directly linked to curriculum outcomes and academic goals, teachers are more apt to make authentic connections and are more likely to take a similar approach with their students (Brooks & Gibson, 2012).

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Enhancing Online Science Instruction for Students with Disabilities Using Universal Design for Learning

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Increasing numbers of students with disabilities are being fully included in middle school general education science classrooms. Unfortunately, a large proportion of students with disabilities in the United States struggle with science. This article describes how middle school science teachers can incorporate the principles of Universal Design for Learning into an online learning environment to improve the level of engagement and performance of students with disabilities. By strategically targeting middle school learners with disabilities, science teachers and professional development facilitators can actively engage their students throughout this unprecedented shift towards online instruction. Incorporating the resources outlined in this paper provides science teachers and professional development facilitators a starting point to meet the growing demands of a diverse student population in the online environment.

Keywords: Universal Design for Learning, middle school, students with disabilities, science education, inclusion, STEM, professional development, distance learning, online learning, general education

INTRODUCTION

Increasing numbers of students with disabilities (SWDs) are being fully included in general education science classrooms (Snyder et al., 2019). Unfortunately, a large proportion of SWDs in the United States struggle with science. According to the latest eighth-grade National Assessment of Educational Progress (2015) report, approximately 71% of SWDs scored below average in science compared to 36% of students without disabilities. A comparison of students' fourth- and eighth-grade science scores indicates that this gap increases substantially during middle school. This is likely because SWDs receive intensive remedial instruction in reading, writing, and mathematics at the expense of other subjects such as science. These deficits are compounded as the curriculum introduces vocabulary and concepts that build upon previous knowledge (Marino et al., 2014). As a result of the novel Coronavirus (COVID-19), a majority of middle schools have moved towards online instruction placing SWDs at an even greater disadvantage as online instruction disrupts access to classroom interventions, assistive technology, and hands-on science instruction. This article describes how professional development facilitators and teacher educators can help middle school teachers improve the engagement and performance of SWDs through practical strategies that incorporate the principles of Universal Design for Learning (UDL) into online learning.

INNOVATION

The current shift towards online instruction presents a unique opportunity to incorporate the principles of UDL into an online teaching environment. UDL is an instructional design framework that improves students' ability to acquire and retain knowledge by making learning accessible to a diverse range of learners (Center for Applied Special Technology [CAST], 2018). The principles of UDL are summarized in Table 1.

Table 1

Universal Design for Learning (UDL) checkpoint summary

	Provide Multiple Means of Representation	Provide Multiple Means of Action and Expression	Provide Multiple Means of Engagement
Access	1.1) Offer ways of customizing the display of information. 1.2) Offer alternatives for auditory information. 1.3) Offer alternatives for visual information.	4.1) Vary the methods for response and navigation. 4.2) Optimize access to tools and assistive technologies.	7.1) Optimize individual choice and autonomy. 7.2) Optimize relevance, value, and authenticity. 7.3) Minimize threats and distractions.
Build	2.1) Clarify vocabulary and symbols. 2.2) Clarify syntax and structure. 2.3) Support decoding of text, mathematical notation, and symbols. 2.4) Promote understanding across languages. 2.5) Illustrate through multiple media.	5.1) Use multiple media for communication. 5.2) Use multiple tools for construction and composition. 5.3) Build fluencies with graduated levels of support for practice and performance.	8.1) Heighten salience of goals and objectives. 8.2) Vary demands and resources to optimize challenge. 8.3) Foster collaboration and community. 8.4) Increase mastery-oriented feedback.
Internalize	3.1) Activate or supply background knowledge. 3.2) Highlight patterns, critical features, big ideas, and relationships. 3.3) Guide information processing and visualization. 3.4) Maximize transfer and generalization.	6.1) Guide appropriate goal setting. 6.2) Support planning and strategy development. 6.3) Facilitate managing information and resources. 6.4) Enhance capacity for monitoring progress.	9.1) Promote expectations and beliefs that optimize motivation. 9.2) Facilitate personal coping skills and strategies. 9.3) Develop self-assessment and reflection.

Note. Adapted from "UDL Graphic Organizer 2.2" by CAST (2018). Retrieved from http://udlguidelines.cast.org/binaries/content/assets/udlguidelines/udlg-v2-2/udlg_graphicorganizer_v2-2_numbers-yes.pdf

Moreover, the UDL framework should be embedded and modeled within professional development and teacher education courses so that pre-service and current teachers can effectively implement UDL in their own classrooms (Lohmann et al., 2018). This instructional design was utilized throughout one semester to teach an online graduate-level science, technology, engineering, mathematics (STEM) education course to in-service teachers. The implementation of the UDL framework throughout the semester eased the transition to distance learning for instructors and students. The subsequent text describes several innovations utilized throughout this course that are practical for middle school virtual science classrooms. These innovations are summarized in Table 2.

Table 2

Resources to Enhance Online Instruction with UDL Alignment

Resource	UDL Checkpoint Alignment	Practical Application
SMMRY www.smmry.com	3.3, 8.2	This web app shortens texts to leave the user with key points. This tool reduces cognitive load so students can focus on their learning rather than processing information.
Flipgrid www.flipgrid.com	8.3, 5.1. 6.4	Flipgrid is a a user-friendly app that enables users to post video discussions to demonstrate their learning. Students can respond to other students with a video comment.
Google Calendar calendar.google.com	6.3, 8.1	Google's calendar tool can be used with any operating system. By utilizing this or other forms of calendars or scheduling apps, educators provide students with structure and opportunities to build executive functioning skills. The calendar provides a template to organize important information for students to remain on track for success in an online environment.
WAVE wave.webaim.org	4.2	Educators can use this website to check the accessibility of online resources before sharing with students.
Padlet www.padlet.com	5.1, 6.4, 8.3	Padlet is a virtual board that a allows students to post text responses, images, links, or videos.
Nearpod www.nearpod.com	5.2, 7.1, 8.2, 2.5	Nearpod is comprehensive student engagement platform. Teachers can upload videos, powerpoints, and other virtual lessons and design quizzes, polls, or other forms of student assessments. Nearpod also allows for the gamification of lesson content so students can demonstrate their learning while playing online. The silver edition is free for educators.
NaturalReader www.naturalreaders.com	1.2, 2.3	NaturalReader can read PDF, Word files, text from websites, and more. Educators can use NaturalReader to enhance accessibility for struggling readers.
Make Beliefs Comix www.makebeliefscomix.com	5.1, 7.1, 7.2	Make Beliefs Comix allows students to create their own personal comic strips. Educators can use this tool as one of many choices for students to demonstrate their learning. This tool also allows students the opportunity to use multiple media for communication.

Multiple Means of Engagement

Teacher educators and professional development providers can increase engagement by cultivating a sense of collaboration and community in the online environment (UDL checkpoint 8.3). Free applications that easily allow for student collaboration include Flipgrid and Padlet (Table 2). The internet hosts a multitude of resources that enhance student motivation, engagement, and performance during online instruction. During online learning, educators should optimize individual student choice by providing flexibility in the completion of tasks. For example, educators should allow students to demonstrate their mastery of science standards with science laboratory reports, digital posters, or instructional videos.

Multiple Means of Representation

Educators should offer students an alternative presentation of auditory and visual information. Providing students with multiple ways of perceiving and comprehending information promotes accessibility in the online setting. One method is to allow for the customization of visual information. For example, educators should provide large print and small print versions of the same document or use different colored backgrounds based on student preferences and/or visual needs. Educators should also provide students with customizable digital files that allow students to choose a variety of colors, fonts, and font sizes. The use of closed captions for videos provides another means of representation and mak-

ing content accessible. The use of symbols such as emoticons and pictorial representations is encouraged in educational settings as they provide a visual representation of text (UDL checkpoint 1.2). A free online website that educators can utilize to ensure websites shared with students are accessible is the Web Accessibility Evaluation Tool (WAVE) by Pope Tech (Table 2).

Multiple Means of Action and Expression

By providing students with multiple means of action and expression, educators remove the barriers that students with unique challenges face. Educators should ensure that students are aware of the accessibility features available on students' devices. Cell phones and computers are equipped with accessibility features that range from text-to-speech, speech-to-text, color inversion, and screen magnification. By optimizing access to tools and assistive technologies (UDL Checkpoint 4.2), educators can ensure their students are using their devices effectively based on individual needs. Educators should also embrace multiple forms of media to convey a concept. For example, educators can provide the opportunity for students to create a comic strip using web applications like Make Beliefs Comix (Table 2).

RESULTS

Consistent with research on the implementation of UDL within middle school settings, an increase in engagement, participation, and accessibility for middle school students who are impacted by teachers using the UDL framework is expected (Knight et al., 2015; Marino et al., 2014; McMahon et al., 2016). For educators who undergo training in UDL through professional development or college courses, the authors expect to find that these educators will be highly satisfied with how UDL impacts their own learning and will have a rich understanding of the UDL framework and how to implement the framework within their own setting (Boothe et al., 2020; Lohmann et al., 2018). In a recent study completed by Lohmann et al. (2018), graduate students who were engaged in an online graduate course with UDL embedded within the course reported feeling supported in their learning and "more connected to both the course professor and to other students in the course," (p. 9).

IMPLICATIONS

The incorporation of UDL into online learning environments has several implications for teacher preparation, educational policy, and SWDs. When thinking about teacher preparation, there remains a shortage of effective teachers across subject areas, especially science education teachers (DeMonte et al., 2016). Using the UDL framework as part of teacher education may lead to more effective teachers in the classroom who are ready to meet the needs of a growing diverse student population. Regarding educational policy, the Individuals with Disabilities Education Act (IDEA) states that IDEA funds should be used to support "technology with universal design principles and assistive technology devices, to maximize accessibility to the general education curriculum for children and disabilities" (IDEA, 2004). The UDL framework includes the use of assistive technology and goes further by applying the principle of universal design into the learning process for students of all diverse needs.

Regarding the implications of UDL for SWDs, UDL remediates many of the difficulties that SWDs face when transitioning to online learning. For example, students with ADHD often express difficulty with executive functions such as mental flexibility, working memory, and attention (American Psychiatric Association, 2013). Students with a Specific Learning Disability (SLD) such as Dyslexia often express delayed language development, diminished understanding of vocabulary, weak phonological processing, and short-term memory deficits (American Psychiatric Association, 2013; Washington, Compton, & McCardle, 2020). The UDL principles relevant to students with ADHD and SLDs are disaggregated by symptoms and intervention in Table 3.

Table 3

Summary table of deficit, corresponding UDL checkpoint, and recommended intervention

Deficit	UDL Checkpoint	Intervention
A. Language, Symbols, Expression, and, Communication	2.1	Vocabulary Lists
	2.2	Reading Outline
• Short-Term Verbal Memory	2.3	Visual Word Breakdown
Deficits	5.1	Verbal Word Pronunciation
• Delayed Language Develop-	5.2	Concrete Terms and Phrases
ment	5.3	Adjust Vocabulary
• Poor Vocabulary		Chunk Information
• Weak Phonological Processing		Have Students Explain Concepts
		Use Multimedia
		Provide Spellchecker and/or Calculator
		Provide Real World Examples
		Provide Differentiated Models
B. Executive Function	6.1	Break Down Instructions Into Steps
• Difficulty with Mental Flex-	6.2	Chunk Information
ibility	6.3	Check Student Understanding
• Poor Working Memory	6.4	Develop a Reward System
• Inattention		Provide Transition Warnings
		Set Clear Expectations
		Keep Classrooms and Lessons Organized
		Provide Unit and Lesson Summaries

Using UDL, a student who is normally provided with an in-class reader could be provided this same accommodation in an online setting through the use of NaturalReader (Table 2) which is in alignment with UDL checkpoints 2.3 and 4.2 (Table 1).

Many SWDs have difficulty comprehending a science curriculum that includes a complex vocabulary. Using UDL, teachers could address this need by providing digital science picture vocabulary flashcards to their students. These flashcards would include a word and a pictorial representation of the word on the front of the card and the formal definition of the word on the back of the card. To further help students who have difficulties with language, symbols, expression, and communication, teachers should consider adopting UDL checkpoints 2.1, 2.2, 2.3, 5.1, 5.2, and 5.3 (Table 1). This would provide students with digital resources such as lists that define vocabulary and scientific symbols for each lesson and presentations that chunk information into smaller parts.

In closing, by incorporating a wide range of UDL checkpoints into each online lesson, teachers can ensure that a diverse range of students can participate in lessons, activities, and virtual labs, while also increasing the effectiveness of online instruction and exceeding the requirements set forth by IDEA. With as many as 25% of SWDs in postsecondary settings enrolled in science and engineering fields (Scanlon et al., 2018), professional development and efforts must target middle school science teachers to implement principles of UDL. The resources outlined in this paper provides professional development facilitators and teachers with a starting point to meet the growing demands of a diverse student population in both classroom online environments.

FUTURE RESEARCH

Future studies will empirically evaluate the use of UDL in both undergraduate and graduate courses from both a program evaluation and performance standpoint including but not limited to the evaluation of educator reactions and affect and educator knowledge acquisition and retention (Guskey, 2016). Future research should also explore UDL ease of use in online and virtual environments.

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Remote Instruction for Students Who are Blind or Visually Impaired: Experiences of Preservice Interns

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Salus University's Department of Blindness and Low Vision Studies prepares preservice educators and specialists to work with children and youth who are visually impaired, with special attention in the areas of Orientation and Mobility (O&M) and Education of Children and Youth with Visual and Multiple Impairments (TVI). Professionals in these fields practice in a variety of settings, including but not limited to schools, homes, and communities. Given the stay-at-home guidelines established by federal and state governments due to COVID-19, these traditionally face-to-face services have been disrupted. Remote instruction has provided outlets for meeting student, intern and program needs in creative ways to ensure continuity of services. Moreover, the unforeseen challenges presented opportunities for growth and learning for all involved. It is the responsibility of universities to prepare interns to use a variety of tools (low- and high-tech) to reach students and their families in both direct and remote modalities.

INTRODUCTION

Salus University prepares graduate students to become Teachers of Students with Visual Impairments (TVI) and Orientation and Mobility (O&M) Specialists in classroom or itinerant settings. TVIs ensure students who are visually impaired can access the general education curriculum and teach specialized skills for independence (e.g., braille, access technology). O&M Specialists teach students with visual impairments skills for safe and independent movement indoors and outdoors (e.g., long cane skills, street crossings).

The sudden shift from predominantly face-to-face, one-on-one instruction during the pandemic highlighted the importance of student and family engagement, use of new technologies, and creative ways of assessment to ensure continu-

ity of services. Given the benefits of parental engagement for positive school outcomes (Park & Holloway, 2017; Wang et al., 2014), families' roles in their children's education may have changed from complementary to essential facilitators of learning (Burgess & Sievertsen, 2020). Family engagement can increase by using technology (Olmstead, 2013), although disparities in technology access still exist across socioeconomic levels and for underrepresented groups (Madden et al., 2013; Purcell et al., 2013).

INNOVATION

Three interns—classroom TVI, itinerant TVI, and itinerant O&M—used existing resources, suggestions from cooperating teachers and faculty, and their creativity to design instruction when their internships shifted online.

Interns oriented students and families to new online platforms and arranged for families to receive or pick up specialized equipment like braille materials, iPads, and slant boards. They discovered that some families did not have reliable internet access or needed language interpreters. Instruction was designed following an Individualized Education Program (IEP) goal analysis process to determine which goals could be addressed virtually and how. For example, conceptual goal components (e.g. intersection analysis) were addressed virtually, while skill-based components (e.g., live street crossings) were postponed.

When using technology, interns explored unique features to support instructional goals. For example, tracking a child's eye gaze, usually observed in person, was monitored via videoconference with the use of video pinning to focus on one student at a time. Also, a shared Google Doc was used to involve the parents in collecting data throughout the week.

The work described above can be replicated and enhanced by educators in the following ways:

- proactively survey families on how to communicate when face-to-face instruction is not possible, and keep updated information ready, noting that needs/preferences may change at times of crisis.   A handy resource file (e.g. live translation services offered by the school) can avoid delaying services families and minimize stress.
- engage in IEP goal analysis to determine which components can be addressed virtually and which components must be postponed.
- capitalize on shared documents for a collaborative approach to data collection beyond the limited available instructional time. The ability of these documents to be instantly shared with the educator/team allows professionals to adjust instruction based on parental feedback in *real time*.
- record live sessions (with permission) to allow students/families to review content between sessions.
  Additional guidelines are provided in the Implications section.

RESULTS

Initial results from the shift to virtual instruction have been positive overall. Lessons continued to be individualized to the student needs and goals, instructional materials were provided in each student's preferred format, and expectations for student participation were based on their skill level (see figures in Appendix for examples).

Students' responses to remote instruction varied, including resistance, excitement, settling/acceptance, and numbness. Most missed the hands-on learning and direct social contact. Some students with additional disabilities presented challenges related to behavior management, following directions, and maintaining independence. Oftentimes, these students required more assistance from parents to navigate the technology and stay on task. Some students required reminders (e.g., phone call or email) to participate or complete assignments, and some experienced drops in homework completion.

Documentation of goal progress was accomplished in creative ways, although at times presented challenges, particularly during asynchronous lessons or when students did not activate their camera to allow direct observation. Another challenge was identifying signs of visual fatigue, particularly if students deviated from their typical font size on their screen.

Overall, synchronous instruction was consistent with the duration and frequency listed in the IEP, except for when technology malfunctioned or Wi-Fi connections dropped. Interns reported gaining a deeper understanding of their stu-

dents' families, who in turn developed a greater appreciation for TVI and O&M services and the value of carryover at home.

IMPLICATIONS

Challenges and successes experienced by interns, students and families inform the following steps and guidelines when working remotely in similar situations:

1. Communicate with Families

Many students require direct assistance from caregivers to participate in remote schooling (Nir-Gal & Klein, 2004; Reich et al., 2020), making it essential to contact the families early on. If you have not yet met, introduce yourself and identify:
- need for didactic materials: this may include braille paper, long canes, calendar box, etc. that may be mailed to the home or picked up at school (Blagg et al., 2020).
- workspace setup: discuss illumination, contrast, organization, ergonomics, etc. in the home to maximize success and comfort (Erin & Topor, 2010).
- best ways for communicating: this may include finding out the student's new instructional schedule and appointments with other service providers to spread out instruction and team teach when appropriate. Identify language barriers, secure services as needed (Blagg et al., 2020; Reich et al., 2020), and ensure families know how to reach you.

2. Plan Instruction

Before starting remote instruction, review student records to determine baseline data and identify which goals may be accomplished remotely and which may need to be adapted/postponed. Consider the students' skill level with mainstream and access technologies, and set them up for success, prioritizing familiar technologies, emphasizing retention of learned content, and keeping lesson duration short but meaningful (Reich et al., 2020). Keep in mind potential behavior management needs when planning lessons and develop strategies (e.g. reinforcement charts) with the team ahead of time. Build data collection methods into the lesson.

3. Deliver Instruction

At the beginning of each lesson, review expectations and objectives (CAST, 2018), and ensure that the learning setup is appropriate. Assist the student and family with identifying problems and troubleshoot any issues as they arise. Ensure that the student and family can easily locate assignment feedback. At the end of the lesson, identify additional resources needed, and review upcoming assignments and lesson dates/times.

4. Monitor Progress

Monitoring student progress is imperative to drive instruction (Hauser, 2017). Keep data collection instruments and notes handy during the lesson. There may be opportunities for students and families to actively participate in tracking performance. Survey issues with technology (e.g. phone versus videoconference) and materials on an ongoing basis. Use this data to inform future lesson planning.

5. Collaborate with the Team

As informal opportunities to interact with team members in the school are lost during this time, consultative services must be intentional and scheduled ahead of time. Daily schedules may need to be reorganized and reprioritized (Dalton et al., 2020). Students' needs across classes may change given the mode of delivery, and consultation can prevent issues like inaccessibility of curricular content presented remotely (Wolffe et al., 2002). It may be helpful to remotely team-teach with another professional to observe, offer suggestions related to sensory needs when appropriate, and foster a collaborative instructional approach.

TVI Considerations

Keep in mind that there may be changes to the existing specially designed instruction when the instructional delivery mode changes (e.g. a student who benefited from preferential seating may now need an ergonomic workstation). More time may be required to make necessary and timely accommodations to learning materials. Make sure that everyone on the team shares contact information. In some situations, the TVI may be a point person for ensuring access to instruction by other providers (Wolffe et al., 2002).

O&M Considerations

The field of O&M has explored the use of videoconferencing for direct service (Dewald, 2019; Dewald & Smyth, 2014; Holmes & Prentice, 2015). As many O&M goals require community travel and have safety implications, portions of these goals might not be able to be accomplished virtually (e.g. store closings, danger of contagion). However, there may be aspects of almost any goal that can be addressed remotely.

FUTURE RESEARCH

The field of special education must continue to develop research around remote learning. Universities should include relevant research within their curricula and offer student teaching exposure to remote learning. Interns need to be fully aware of public health guidelines and their impact on the school environment upon re-entry, as well as its effect on the experience of students with visual impairments. Classroom configurations may change, and social distance measures that require vision (e.g. printed signs, tape markings) need to be adapted for compliance by students with visual impairments. School personnel should consult with blindness and low vision professionals when devising systems for student travel that maintain their safety without compromising their independence. Finally, best practices in this area may be applicable beyond situations of pandemic (e.g., prolonged school closures due to weather emergencies, etc.), bringing additional value to this research.

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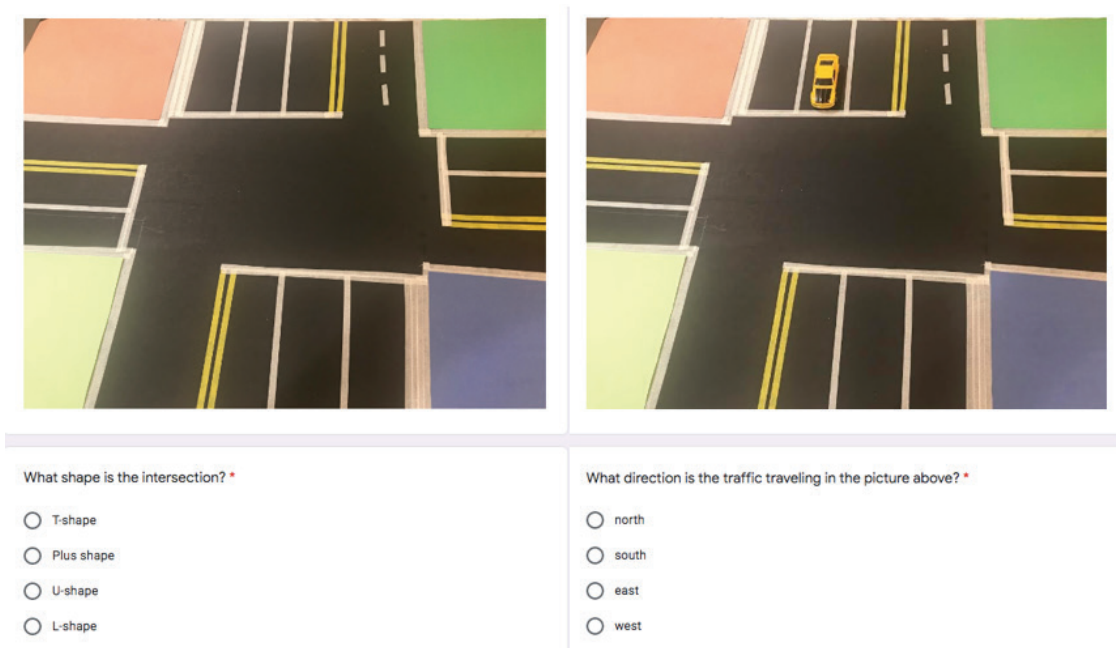
Figure 1. Two online quiz questions that ask the student to analyze visual representations of an intersection.
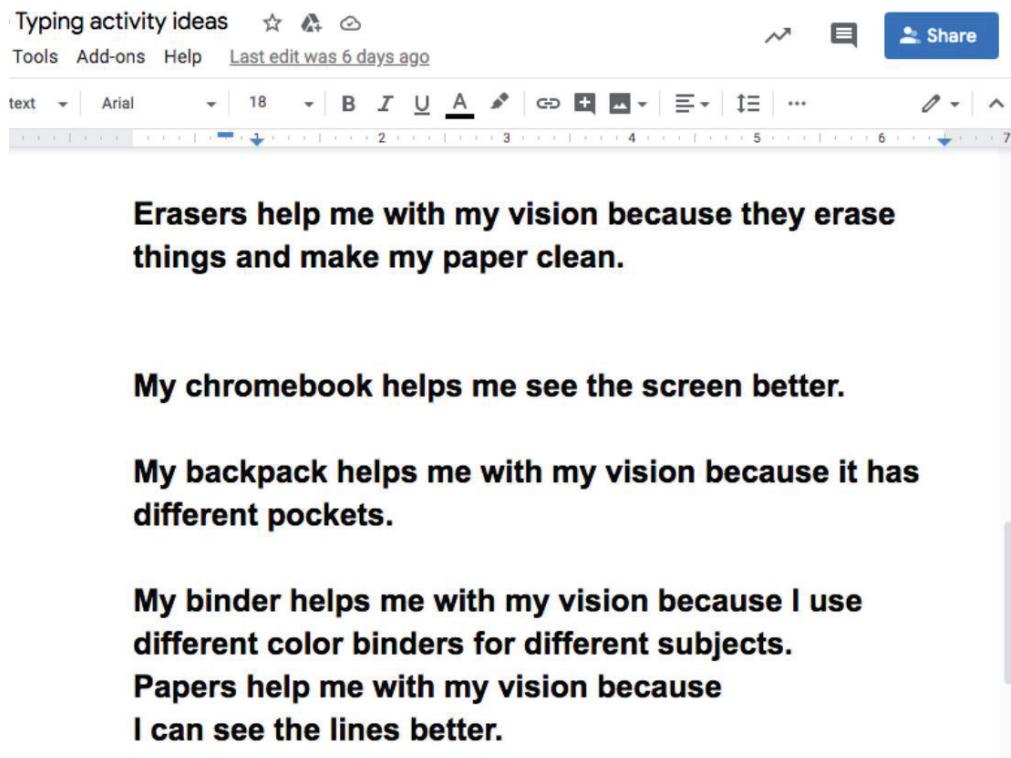

Figure 2. Shared Google Doc in which student identifies strategies that assist their visual performance.

Learning Outside the Classroom though Collaborative Practices Utilizing Universal Design for Learning

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Remote education has quickly evolved due to the COVID-19 pandemic particularly with students dispersed throughout a geographic area. However, little is known about providing physical education learning experiences remotely to students, including those with disabilities. This chapter describes the collaborations between faculty in higher education, public school teachers (in-service), and college students (pre-service teachers) providing remote physical education instruction to students throughout the Seacoast, New Hampshire utilizing the principles of Universal Design for Learning (UDL). Embedding components of Universal Design for Learning within the instruction offers students multiple ways of engaging and participating in activities given limited home resources and the challenges students and parents face completing assigned tasks (CAST, 2018).

INTRODUCTION

Technology-mediated teaching and learning enable access to educational opportunities, irrespective of locality or remoteness. Developing responsive online learning experiences are a product of appropriate curriculum, support, and interactions between teachers and students (Patel, 2014). However, online instruction presents its unique challenges including learners' engagement in activities and instructional delivery that help students in the schools connect with their instructors as members of a learning community (Sato et al., 2017).

Within the schools, moving to a remote learning environment required technological and pedagogical expertise between higher education faculty and teachers, both in-service and pre-service. Because little is known on the effectiveness of remote learning in the area of physical education, the collaboration between the educators was essential for establishing clear guidelines for content delivery and best practices (Janssen et al., 2012). Collectively, the educators adapted the principles of Universal Design for Learning as a framework to support a curriculum that was accessible and meaningful (CAST, 2018).

INNOVATION

Higher education faculty, in-service, and pre-service physical education teachers met a minimum of once a week via zoom to discuss a collective platform that would engage elementary-aged students in physical education programming (Thousand et al., 2006). The team defined their purpose as instructional delivery to elementary students to provide age-appropriate content. Collectively, the team adopted the framework of Universal Design for Learning (UDL) as it provides flexibility in the ways students engage with the material and the information that is presented as well as the ways students respond or demonstrate knowledge and skills (CAST, 2018; Lieberman, et al., 2020). Given the potential barriers of remote instruction, consideration of the elements of UDL could provide accommodations while maintain-

ing high expectations for all students, including students with disabilities (HEOA, 2008). The principle of engagement necessitated the creative use of space and materials. Equipment needed to be readily available with skills and activities that would interest students. For example, during a juggling video, students could use either plastic bags, scarves, or napkins. Skill development videos were often themed and gave students a choice while encouraging creativity. The second principle, representation, required the delivery of material through multiple formats. Pre-service and in-service teachers modeled the skills and reinforced learning with written cues and appropriate visuals embedded in the videos to provide all students access to the material in whichever way best suited their learning strengths. The final principle, action and expression, was particularly important given that there was no direct contact between teachers and students. Teachers encouraged video, picture, or written responses of their students through the schools' designated virtual platform. Physical activity was prioritized over skill development.
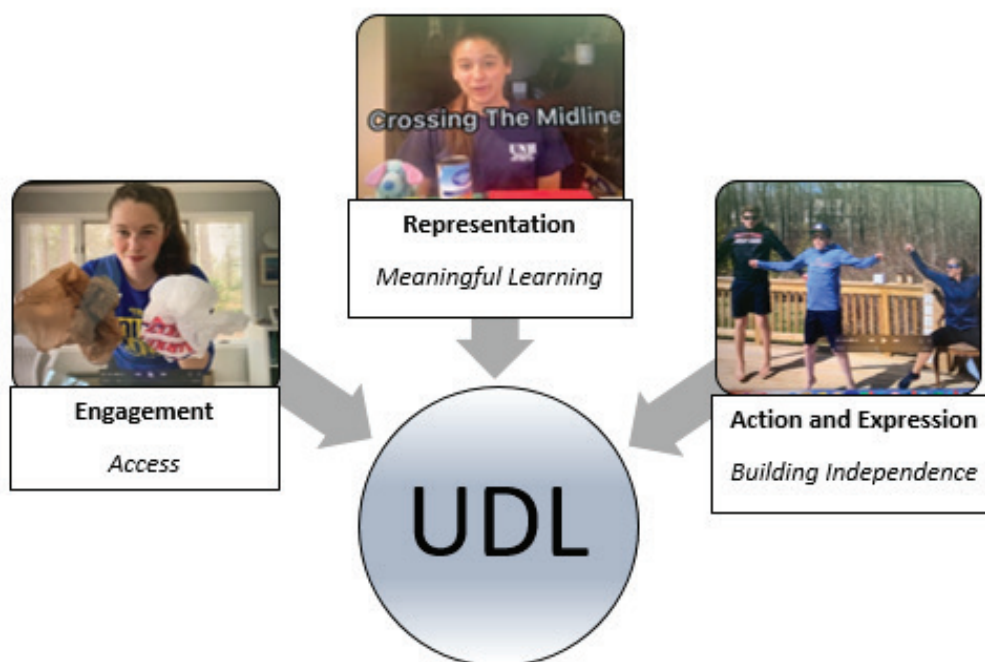

Figure 1. depicts the three principles with images taken from the instructional videos.

A YouTube channel was developed with playlists that addressed content areas including throwing and catching, locomotor patterns, striking, yoga, fitness, and supporting physical education for students with disabilities. In-service teachers met with pre-service teachers twice weekly for two hours to discuss lesson plans and videos that would be developed. All of the videos were made available to the public and placed into an appropriate playlist for elementary students. The playlists were created to sort material into grade-level outcomes and were named with an associated "I can" statement that reflects the student's goal of the GLO. Some videos fell into multiple categories, and as a result, were shared in all appropriate playlists. Other playlists such as Obstacle Courses, 5210+ Healthy Habits, and Supported Physical Education were created as more general learning categories.

The videos incorporated UDL principles (engagement, representation, and action and expression) with instructional approaches designed to meet a range of students' abilities and skills. Parents could then select a specific video or playlist for their child, knowing that the video focused on developmentally appropriate outcomes. In-service teachers shared the link on their school's virtual platform.
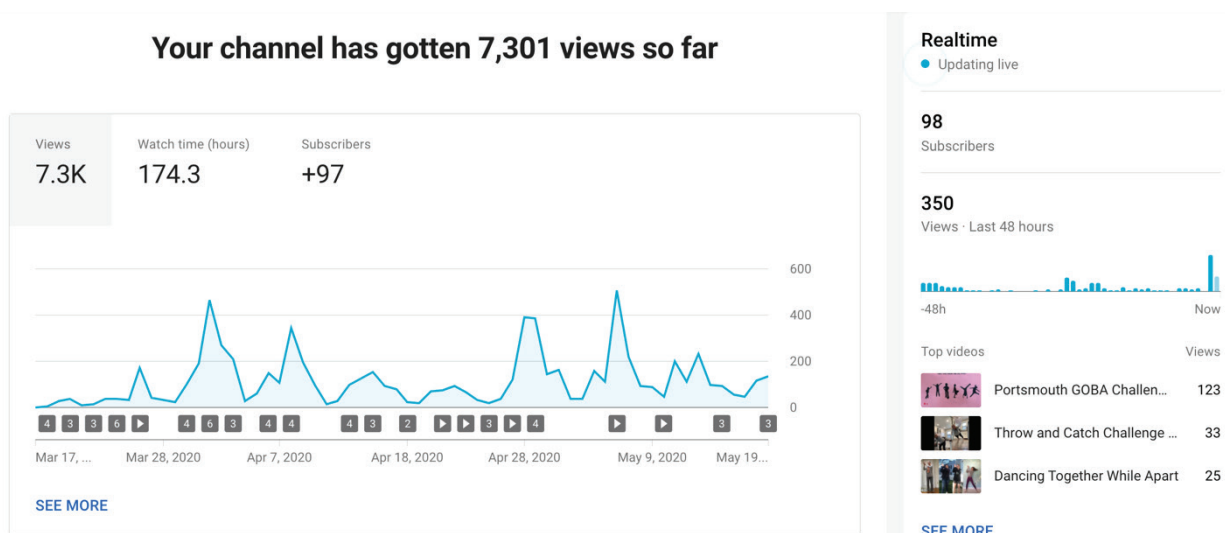
RESULTS

Figure 2 & 3. The analytics of the Seacoast page in reach and views as of May 20, 2020.

Preliminary results as illustrated above reflect the impact of the YouTube channel in collectively providing learning resources that could easily be accessed by both family members and their children. The Youtube channel was effective in reaching a larger audience of both educators in the field and parents interested in physical education content for their child. Additionally, faculty, in-service, and pre-service teachers' response to the collaborative practices using UDL was overwhelmingly positive. In-service and pre-service teachers described themselves as becoming more skilled in technology and the methods needed to develop videos and instructional materials that could be shared with families. See examples in the Seacoast PE YouTube Channel. https://www.youtube.com/channel/UClpm0w1xdMsD1FvB2s6DlIA/

There were two primary benefits of the collaborative practices developing instructional videos that incorporated UDL. The first was the discussions and work examples shared during the weekly zoom sessions. Utilizing the principles of UDL encouraged both pre-service and in-service teachers to consider how to engage learners with readily available equipment. Instruction extended beyond skill modeling to utilize language that could motivate with embedded scripts that reinforced learning. Lastly, teachers recognized that action and expression of student learning moved outside the parameters of traditionally associated grade-level outcomes to forms of movement that reflected the students' home environment. Stuffed animals were boundary markers that could be used to define the movement. Furniture could be used as obstacles to move around. Essentially, teachers became flexible in their expectations of student learning.

IMPLICATIONS

Collaboration between higher education, in-service and pre-service teachers was essential in delivering on-line physical education instruction to elementary-aged students (Al-Abri et al., 2017). In-service teachers responded positively to the collective work creating a shared platform (YouTube channel) that could be accessed across national and international borders. All of the collaborators learned and implemented new and unique strategies to elevate and encourage their teaching on virtual platforms (Thousand et al., 2006)

In terms of the application of UDL components in each of the three areas, examples of both pre-service and in-service teachers utilizing engagement included: equipment that was easily available to students, music that was incorporated into the videos, pets and/or stuffed animals that students could identify with imagery that engaged students such as Star Wars, SpongeBob and create your own world (Lieberman et al., 2020). Pre-service and in-service teachers' application of the UDL principle representation included focused use of the camera, graphics embedded into the screen, repeated examples of skills, and the use of verbal and visual skill cues (Grenier et al., 2017). Pre-service and in-service use of the third UDL component, action and expression was witnessed by parent and student responses on the individual school's leaning platform through videos, pictures, and written responses of students demonstration of the skill uploaded by parents. Pre-service and in-service teachers articulated and expanded understanding of students' learning through the students' responses.

Recommendations for collaboration between higher education faculty, in-service and pre-service teachers in developing remote learning include:

1. Weekly zoom meetings with clearly identified goals
2. Mutually supporting relationships between pre-service and in-service teachers for accessing technology and supports necessary for remote learning.
3. Establishing a consistent and scheduled meeting between in-service and pre-service teachers in the discussion and development of appropriate content.
4. Ensuring a shared platform for content delivery that is easily accessible to students.

Recommendations for embedding UDL principles in remote learning include:

1. The provision of equipment options as students will not have "traditional" equipment available.
2. Provide visuals on the materials that will reinforce learning cues, enhance creativity and structure the sequence of instruction.
3. Provide printable resources so that children can work independently.
4. Make recordings easily visible with camera angles focused on key learning sites.
5. Provide maximum opportunity for student creativity and relatable themes.

FUTURE RESEARCH

There is a need for clearer identification of how the UDL principles can be applied to remote learning. These principles can be used as the framework for collaborations between faculty, pre-service and in-service teachers in developing materials for remote learning. When applying the UDL framework all stakeholders must understand that variability and flexibility are key to the development of materials incorporating the principles. Examining student learning outcomes for instruction may also provide an expanded understanding of the relevance of UDL principles for remote learning.

Given the rapidly changing educational settings, higher education faculty must stay abreast of emergent technologies and ways of learning to provide optimal learning experiences for pre-service teachers (CSN, 2020). Future research could also examine the collaborative learning relationships between faculty in higher education and in-service teachers working with their pre-service student teachers in fostering the capacity of the teachers as future educators with online learning (Vitelli, 2015). Collaboration between educators should focus on access and reducing barriers and the educational community must have clarity on operationalizing student outcomes with UDL applications (Lowrey et al., 2017).

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Online Teaching Labs to Facilitate Lesson Analysis in Mathematics Methods Courses and Professional Development Contexts

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We describe an innovative online experience that extends the typical use of video to support practicing or prospective mathematics teachers to observe and reflect on instances of practice focused on student thinking. We have termed these "Online Teaching Labs," which have features similar to the studio model, lesson study, or demonstration lessons. During the COVID-19 challenges, Online Teaching Labs provide prospective teachers in methods courses and practicing teachers in professional development with high-quality images of lesson implementation in a condensed synchronous online activity.

INTRODUCTION

Online Teaching Labs are geared to increase prospective and practicing teachers' ability to notice and attend to students' mathematical reasoning (van Es & Sherin, 2008) in a methods course and through professional development, while providing "a vision for what mathematics instruction that focuses on student thinking can look like" (Strayer et al., 2017, p. 19). Online Teaching Labs include features of the studio model (e.g., Higgins, 2013; TDG, 2010), lesson study, (e.g., Fernandez & Yoshia, 2004) or demonstration lessons (e.g., Barlow & Holbert, 2013; Strayer et al., 2017) to support teachers to decompose practice (Grossman et al., 2009). In our Online Teaching Lab, we condensed a full-day activity into a two-hour online session by using video to engage teachers in lesson analysis (Santagata & Yeh, 2013). We used the Online Teaching Lab in two different contexts: with prospective teacher participants in a mathematics methods course and practicing teachers in a professional development course. In both contexts, teachers conjectured how students would engage with mathematical tasks and how teacher moves would influence student thinking.

INNOVATION

Researchers have highlighted the benefits of video use in teacher education to support learning (Gaudin & Chaliès, 2015). Many researchers have incorporated online video-based assignments in face-to-face methods courses as well as virtual methods courses and in professional development (de Araujo et al., 2015; Hixon & So, 2009; Santagata, Zannoni, & Stigler, 2007). Our purpose was to support teachers, whether prospective or practicing (hereafter both groups referred to as 'teachers' unless specified), to engage in deep analysis of students' thinking through a representation of practice (video) and decompose the process through the online interactive elements of the process (Grossman et al., 2009). To implement this process, the video-recorded lesson we used involved the implementation of a rich mathematics task (i.e. Stein, Smith, Heningsen, & Silver, 2000) that were taught in a middle-grades classroom. We edited the video to three clips (five- to ten-minutes each) that focused on student thinking and teacher moves, with a clip from the launch, student work time, and summary discussion (i.e., Van de Walle, Bay-Williams, & Karp, 2019). Prior to the synchronous Online Teaching Lab, we had teachers collaboratively explore the task from the video during an asynchronous component of the course so that they would become familiar with the mathematics, anticipate student thinking, and consider potential learning goals for the task (i.e., Smith & Stein, 2011).

We engaged prospective teachers in a synchronous Online Teaching Lab, using Zoom technology as an online video-based communication platform. We began with a whole-group discussion to connect teachers' prior experience with the task to the specific context of the classroom in the video clips they would watch (e.g., grade-level, student learning prior to the lesson). Teachers examined the lesson goals specific to the classroom context. To engage teachers in viewing and discussing each of the three clips, we employed a structure that included individual think time and group discourse. First, we played the initial video clip via Zoom, using the "share screen" feature from the instructor's computer. To focus teachers' noticing towards the instructional goals of the methods course or professional development, we provided participants with a 'capture sheet' containing one or two guiding questions for each clip along with space to record observations (see Figure 1). Second, to maximize interaction and focus discussion, we paused the video at predetermined moments to give teachers an opportunity to anticipate what the teacher in the video might do next and the implications of the teacher moves. Third, we gave teachers independent think time to anticipate teacher moves and generate their own reflections about how they would respond based on students' thinking. Fourth, we dispersed teachers in breakout rooms via Zoom to discuss their observations and anticipate teacher moves and their potential impact on student thinking. To support teachers in these activities, we also provided images of students' strategies from the video (see student work at the bottom of Figure 1). Fifth, we held a ten-minute whole-group discussion to share contents from the capture sheets and reflect on and connect to what the breakout groups recorded about their observations. After repeating this process for each of the three video clips, these Online Teaching Labs ended with each participant sharing reflections connected to the learning goals of the course. This video (https://www.youtube.com/watch?v=Ybh9II9-OnI&feature=youtu.be) briefly illustrates the classroom teaching, breakout rooms, and whole-group discussion.

RESULTS

We found that teachers were able to deepen their understanding of teaching practices, highlighted in the video, that focused on student thinking in several ways. From the professional development, one teacher commented, "Being able to see it in action gave me a better understanding of how the task should be presented and how to roll it out and all the planning that goes into it before doing it." Additionally, teachers commented that the structure of the Online Teaching Lab enhanced their learning. One teacher shared, "The capture sheets gave me a lens to take notes from and to intentionally focus on the instructor's teaching." Results from the methods course implementation was similar; however prospective teachers highlighted the value of seeing actual student work in coordination with what students were saying and doing in the video. They found the capture sheet and the video pausing for individual think time to create a context for learning and deeper analysis about students' thinking.

Video Clip #2 (Part 1): Small Group Discussions (8:31-11:08)

Focus for Clip #2 (Part 1):
Keeping in mind the lesson goals, what might you ask these students to assess and advance their thinking if you were the teacher?

Assessing Questions	Advancing Questions

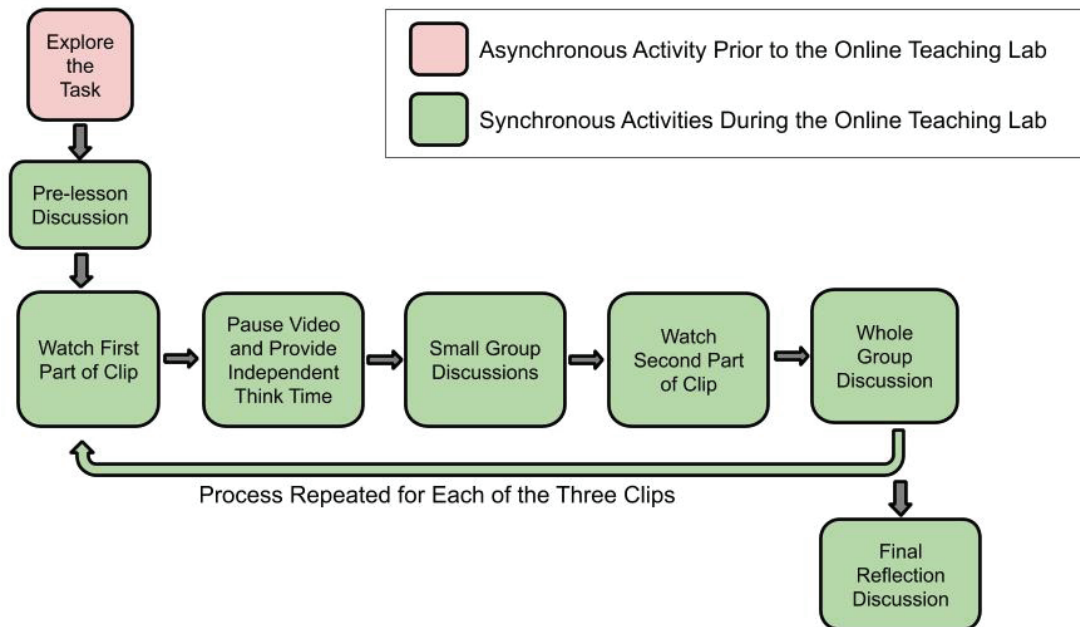**Figure 1.** Capture Sheet.

Figure 2. Online Teaching Lab Process.

IMPLICATIONS

Our Online Teaching Lab model extended the typical use of video in our methods course and in professional development by deliberately encouraging teachers to anticipate, observe, and reflect individually, in small groups, and as a whole class. The model provided teachers an opportunity to study how they would design a lesson and anticipate student thinking. The experience provided opportunities for cycles of observation and reflection to consider the implications of teacher moves on student thinking and opportunities to see components across an entire lesson. Finally, the debrief aspect of the Online Teaching Lab provided an extended time for reflection on how to implement a lesson involving a rich mathematical task. Although these opportunities are typical for face-to-face versions of Teaching Labs, we feel that the additional structure we added to the experience through the collective video viewing, capture sheets, and group discussion enhanced the experience and built from affordances in the online environment.

We have several recommendations to those who wish to replicate an Online Teaching Lab. First, we recommend that teacher educators incorporate several practices we have found to be productive for online experiences, such as: using breakout rooms to allow smaller groups to interact and build community; using whole-group discussions to connect the work done in the small breakout groups; and strategically using synchronous time to build from work done asynchronously, which allows educators to curtail the synchronous length to a time span that's more feasible. Second, we recommend that teacher educators select video clips that: (a) show segments from an *entire* lesson, and are (b) based on instructional goals for the methods course or professional development, such as monitoring small group work as a way to focus on teachers' use of assessing and advancing questions. The inclusion of clips from an entire lesson helps to provide a more complete representation of practice (e.g., Grossman et al., 2009) for teachers. Selecting video clips that highlight the goals of the methods course or professional development ensures that video is used in productive ways to support teachers' learning. Many educators have access to collections of video clips of which some have enough lesson components to accomplish both of these recommendations. Third, we recommend that teacher educators intentionally plan when to pause a video to allow teachers to anticipate productive teacher actions based on their initial observations of classroom events. Comparing anticipated teaching moves to the actual moves made by the teacher in the video promotes productive observation, reflection, and discussion of how teacher moves impact student thinking. Fourth, we recommend that teacher educators create a capture sheet with guiding questions and space for prospective teachers to record noticing evidence for each video clip to focus participants' noticing towards particular instructional goals.

FUTURE RESEARCH

In the future, we plan to research the possible benefits of the Online Teaching Lab for both prospective teachers in methods courses as well as practicing teachers. Specifically, we are interested in the dialogue that occurs through the synchronous aspects of the Online Teaching Lab; we consider those elements indicative of learning and reflection. We have analyzed other project data for cognitive, social, and teaching presence (see Choppin, Amador, Callard, & Carson, 2019) through a community of inquiry framing (Garrison, Anderson, & Archer, 2001), and plan to conduct a similar analysis on the interactions that occur through the Online Teaching Labs in multiple contexts. As the COVID19 pandemic prompted a rapid transition to online learning, we believe that our Online Teaching Lab model will provide teacher educators a new learning activity for their methods courses or professional development contexts.

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Online Simulations Enhance Learning and Class Relationships Through Shared Embodied Experiences

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This article details the use of simulations to enable embodiment and affect in learning and teaching. It explains how simulation was successful as an asynchronous learning task for Master of Education students studying current approaches to student wellbeing while situated in a number of countries. Online simulations as part of a universal design of learning provide a personalized yet shared experience for students regardless of geography, resulting in rich, reflexive online discussions that can build the supportive relationships that promote learning, even in times of crisis.

Keywords: social emotional learning, student wellbeing, simulation pedagogy, trauma informed practice, embodiment, reflexivity

INTRODUCTION

Student Wellbeing: Current Approaches is a subject of a master's level degree specialization of student wellbeing in Melbourne, Australia. The subject aims to develop critical reflexive skills for teachers' personal and organizational practices by familiarizing them with current evolutions in the field. Students learn to analyze contextual factors to consider when drawing on the evidence base to inform their practice. At the time of the teaching innovation discussed in this chapter, Australia had just come through the worst bushfire season in history and a number of students were working in affected areas. Classes also included international students from China and other Asian countries who were among the first to experience isolation conditions due to the COVID-19 pandemic. Sensations, affect and emotion inform learning and teaching practices in ways that can be below the surface of conscious thought (Scheer, 2012). Working reflexively to be more aware of trauma and its effects can assist with strategies for reading students and their needs (following Nguyen & Larsen, 2015), disrupting the unquestioned patterns of replicating injustices (Dobia & Roffey, 2017) as well as the self-care requirements of the teacher in practice (Jennings et al., 2019).

INNOVATION

When the university closed and teaching shifted online, there was still a need to inform the learning with awareness of affect in practice. This requires strategies to continue with the reflexive work on affective embodiment. Research into implementation science indicates that teaching for student wellbeing and other social emotional learning is most effective when embedded in collaborative learning (Cahill et al., 2018). Therefore, the best activities for this subject were debates, guided discussions, games, role-plays and micro-teaching as these allow university students to experience and practice collaboratively. This work often requires scaffolding skills for students who may be unfamiliar or uncomfortable with these teaching techniques. Reading the bodies and words of the students, the lecturer is assisted in identifying when students may require further support and this work in turn, allows teachers to gain more skill and familiarity with these important teaching approaches for their own practice.

When teaching online, simulations provide shared learning experiences (Bobstock, 2018) regardless of where students are in the world (Frydenberg & Andone, 2018), stimulating cognitive processing while engaging learner capabilities, knowledge, beliefs, and affect (Moreno & Mayer 2007; Moreno, 2010). Following this research base, developing simulation activities online offered the opportunity to create a collaborative learning space, moving beyond substitution of the previous in-person pedagogy, to provide the advantage of new virtual environments for shared experiences (following Cochrane et al., 2014 on SAMR framework). Figure 1 provides an overview of one of one of the modules. Informed by universal design for learning (following Houston, 2018), choices in the means of engagement with and evi-
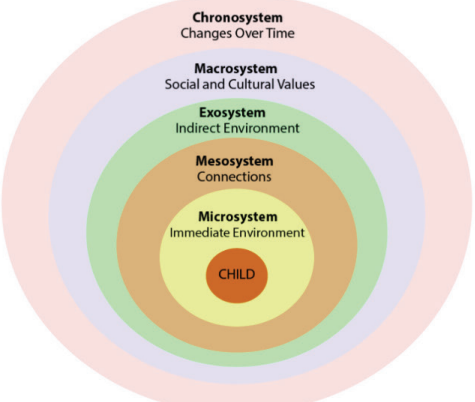
dence of learning was essential in the construction of each of the four (f2f seminars would have been 6 hours each) modules in the subject. There was one hour and a quarter synchronous ZOOM session, a recorded lecture, and then students were invited to engage with the module (see Figure 1).

Figure 1. Asynchronous Module 1.

Embedding online simulations and games with opportunities for shared reflexive discussions provides a way back to embodiment and emotion and helps to meet the pedagogical requirement of collaborative learning. Simulations provide opportunities to walk in the shoes of others, be reflexive together in discussion, and to also explore the potential of the embodiment of affect in learning that we all experience in playing through the simulations. I embedded existing simulations as optional learning spaces, seeking out free, internationally available resources that would provide opportunity to explore different perspectives and experiences students could explore and then discuss, in terms of reflection on content, and also in terms of possible learning materials for their own teaching. In light of the affective response expected (Moreno, 2010), it was important to flag that the circumstances explored within the simulations might indeed be difficult and close to some current lived experiences. Figure 2 provides an example of such an activity. This was the fifth choice in the module above (in Figure 1) which studies ecological impacts, risks and protective factors for student wellbeing, problematizing some of the systemic factors which impact on student wellbeing in school communities.

ASYCHRONOUS TASK: Simulation

Play through the following game-based simulation to consider what the ramifications for wellbeing are in circumstances of disadvantage. PLEASE NOTE, we are all experiencing incredibly quickly changing circumstances and this simulated experience is designed to demonstrate some of the systemic difficulties people face during economically challenging and precarious times. This may not be a helpful learning activity if you are feeling current concerns so please consider if this is the right choice for you right now or consider some self-regulation strategies for emotional responses to this simulation. As we have read, simulations have strong impacts on embodied and emotional responses in learning environments and it is important that we know our students and provide support when using them in our teaching.

Play through http://playspent.org/

Post your response to this game as a discussion below. We will reflect on this and other activities in our next synchronous session. You may, but do not have to respond to the posts of others.

Figure 2. Sample Simulation Task.

Other simulations used in the remainder of subject delivery included opportunities to explore student anxiety: https://ncase.me/anxiety/ and developing strategies for building resilience in a community: https://developingchild.harvard.edu/resilience-game/.

RESULTS

The available choices for asynchronous activities included annotated videos, questions, systems models (another popular choice using a free online tool) and different reading group discussions. Students were asked to do two, but several did all the activities. Just over 90% of students chose a simulation activity each week. Online discussions developed into deep systemic analysis. Despite being given the choice of whether or not to respond to the reflections of others, almost all the students did.

Institutional rules do not permit me to share their contributions, but from my teaching notes, in synchronous sessions students referenced their learning from the simulations and continued their online discussions. Students were able to talk about the limitations of the 'characters' they played in the simulation. They were able to draw relevant insight into understanding some of the challenges they were experiencing with disadvantaged families, and observations about the differences that would likely exist in the different safety nets in schools in their countries. They also shared and reflected, unprompted, the different ways that culture informs the way people are likely to seek help (Dobia & Roffey, 2017). Students remarked that simulations allowed for a visceral embodied reaction, which added to the learning, increased empathy and understanding to disrupt unchallenged beliefs in practice (following Scheer 2012) and discuss some self-care for their own wellbeing (following Mulcahy, 2012).

Despite the challenges included in COVID-19 related circumstances and the unexpected online teaching and learning, simulation allowed students to develop essential relationships with the lecturer, each other and their learning (Alshahrani, Ahmed and Ward, 2017). Moreover, they developed critical skills around choosing simulations that would and would not be appropriate for their own work with students online, identifying the boundaries of emotional experiences and reflexivity (following Scheer, 2012) at different stages of child development. In online learning, using simulation in teaching student wellbeing was successful in both modelling collaborative learning, and developing new critically informed skills to determine the usefulness of particular simulations for the educators' own teaching contexts.

IMPLICATIONS

All teaching includes embodiment and feelings that help the student and the lecturer to meaningfully synthesize learning and the place it holds in their being and place in the world (Mulcahy, 2012; Stoltz, 2015) and is important to academic outcomes and inclusivity (Alshahrani, Ahmed, & Ward, 2017).These relationships and feelings are transformed in the context of online learning (Freeman et al., 2013). The physical distance between students and lecturers in education can create a feeling of separation (Frydenberg & Andone, 2018). It is less likely that students will disclose needs for support in less personal online relationships (Houston, 2018), and therefore students are often less likely to receive needed accommodations, including additional language support, in online learning subjects (Barnard- Brak & Sulak, 2010; Houston, 2018). The opportunity to share with other students, and discover, practice and learn together and from each other is also less available. In planning for using simulations the following steps will be helpful to follow:

1. Working from the learning objectives for the subject, consider where skills will benefit from the lived experience of 'walking in the shoes' of another (following Cahill, 2013).
2. Use search terms that describe that experience, along with 'simulation' to find a suitable simulation. For example, 'simulation teach* poverty' yielded the example above.
3. Play through the simulation several times. Consider what emotional responses are likely and whether there are specific descriptions you should provide for your students so they can decide whether or not to participate (Bostock, 2018).
4. Provide clear instructions on how students should use the simulation, including what the specific outcome you would like the students to achieve (Barnard-Brak & Sulak 2010). If there are questions you would like them to answer, or evaluation criteria you would like them to follow, include them before the students access the simulation . In the case of the example above, the students were encouraged to also note their emotional and embodied responses, as these were of interest to the subject learning outcomes (Mulcahy, 2012).
5. Offer an immediate opportunity to write or record a reflection that can be shared with other students (Houston 2018). Provide prompts for this reflection that are aligned with the evaluation or questions you want them to answer (Barnard-Brak & Sulak, 2010). Encourage students to respond to the findings of others (Bostock, 2018).

In building classroom community and relationships, simulations provide experiential learning and allow students a shared experience despite physical distance. There are several things to be aware of in implementing simulations into teaching. Figure 2 provides a reminder of the things to consider in using simulations in order to care for your students.

1. Simulations invoke embodied responses that are affective and can result in strong emotions (Frydenberg & Andone, 2018). When playing through to test the simulation, consider what likenesses there may be to the lived experiences of the students and to offer a description of the virtual setting and experience and where possible offer choice in activities that will provide students an opportunity to consider the same issue, but in other formats such as readings or videos (Houston, 2018).

2. Including shared reflections of the affect and embodiment in simulation activities brings students closer to the learning, the educator and each other (Mulcahy, 2012, Bostock, 2018). It creates a community of practice where each student brings their own experience and expertise from working through the same virtual scenario as the others.

3. Teacher educators are provided with valuable formative feedback on student learning in monitoring and participating in these discussions (Barnard-Brak & Sulak, 2010).

4. Offer opportunities for reflexive practice (following Scheer, 2012), and encourage students to think critically about the functionality, positives and concerns that emerge in their simulation experiences. This provides opportunity for them to build critical skills for choosing such materials in their own practice. It also helps to disrupt unquestioned patterns in their current practices which might be replicating systemic injustices, challenging assumptions about their students (Dobia & Roffey, 2017).

Figure 2. Reminders and considerations in the use of simulations.

FUTURE RESEARCH

Further study is required into the reasons why students chose this and other simulations as a preferred learning activity and identifying how the successes in this teaching and learning can be replicated across other teacher education. This example only used materials that were accessible in all the countries that students were in and were free, but in-teacher training this emerging area of pedagogy, as well as the further enhancements of virtual reality hardware offer opportunities for reflexive embodied practices to be studied further.

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Creating Space for Reflection and Reflexive Responses within a Digital Environment

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This chapter describes one instructor's decision to use reflective and reflexive tools to allow students to work through their trauma while also learning the skills needed to be competent social workers using digital submissions of genograms, ecomaps, and photography. These tools are flexible and appropriate in a K-20 context. The tools help to shape a curriculum that provides practical experience for social work students while allowing them to process the trauma experienced by students disproportionately affected by the pandemic. The instructor describes both the motivation and the intended outcomes of the course curriculum. This research summarizes the strategies used the importance of their use and how they may be studied in the future.

INTRODUCTION

This narrative study describes the use of reflective and reflexive pedagogy to create a meaningful set of projects for students in an undergraduate social work course. These tools are valuable in teacher education and K-20 settings (Baumgardener & Buchanan, 2010; Carpenter-Aeby et al., 2007). The inclusion of retrospective and introspective method(s) in the curricular design of online coursework is essential to enhance learning and improve performance (Chen et al., 2011). In many cases, traditional course delivery can be difficult to replicate online. A retrospective and introspective methodological approach creates room for reflective responses within a fast-paced digital environment, and in essence, a space for processing information while attending to student needs (Bennett & Grant, 2016). Here a social work instructor adapts face to face concepts to provide a reflective space for digital visualization linking theory to practice.

Without the constructs of the classroom setting, students and instructors have the opportunity to look beyond face-to-face modality for self-reflection, a personal connection to theory and related coursework, and independent and profound thought (John & LaVell, 2004). We propose that faculty should create intentional, visually expressive spaces for students and themselves to reflect on the current situation as much as possible in the online environment (Yildiz et al., 2019). This study describes the experience of an instructor in this study who uses reflective photography, genograms, and ecomaps to understand the student experience and to collect qualitative data exploring the ways the students make personal meaning of the concepts taught in class.

INNOVATION

The first author of this chapter is a college instructor and staff member at a large public college in New York City. Her courses socialize students in an undergraduate social work program to imagine themselves in the field, combining theory, practice, and positionality. Given that the course work was highly personal and in the epicenter of the pandemic, she quickly realized that students needed additional supports to retain information. Moving into an asynchronous learning environment in response to the pandemic required an acknowledgment of the challenges in the process. She chose to integrate visual artifacts into the digital environment as a means of retrospection and introspection. The assignments call for projecting pictures in place of words. In this case, Students take full ownership of their work rather than demonstrating mastery through rote memorization. It necessitates deep thought, projection, and serves as a nonverbal reflection.

The instructor teaches an upper-level undergraduate social work class. She uses digital Genograms, an illustration of family dynamics (Appendix A) and Ecomaps, a depiction of connections to resources (Appendix B). While this study is in a college setting, genograms and ecomaps have also been used in K-12, revered as a tool that engages a child's spirit (Baumgartner & Buchanan, 2010), and in teacher education (Perlman, 2016).

Table 1

Reflective Tools for Digital Visualization

Tool/Assignment	Definition	Link to resource
Ecomap	Depictions of connections to resources	https://socialwork.msu.edu/sites/default/files/Koehler/docs/AboutEcomaps.pdf
Genogram	Illustration of fam-ily dynamics	https://www.socialworker.com/feature-articles/practice/a-picture-is-worth-a-thousand-words-genograms-social-work-practice/
Interpretive photography	Using pictures to define theoretical concepts	Barromi Perlman, E. (2016). Using visual reflective diaries of photographs of school buildings as a tool for empowering students in teacher training. *International Journal of Qualitative Methods*, 15(1), 1-15. Available at: https://journals.sagepub.com/doi/pdf/10.1177/1609406916653760

Students were able to create these using a free cloud-based tool in *Visual Paradigm*, a Unified modeling language (UML), computer-assisted software engineering (CASE) based tool. These cloud systems are ideal for visualizations of course content. Students unable to access the software were able to use templates provided by the instructor. These visual tools served two purposes; the first was a check-in for the student to understand how the students were coping. The second was to model the use of the tools as a check-in for future social work clients.

Genograms include a legend key that defines the symbols used throughout the diagram for the reader. The second step in this process requires a student to engage in a reflexive process when it comes to gathering their family history, accurately depicting the biographies, and actively sharing their legacies in this format. This assignment serves as an example of the pairing of reflective responses necessary for completing the assignment but to begin a dialogue. The student illustrates their story in the picture but chooses the symbols that define the dynamics of their family legacy. The visualizations aid them in developing critical thinking skills, enhancing knowledge of conceptual framework(s), and understanding the principles of advocacy. For social workers and future educators, this is a skill set that will be invaluable professionally.

The first step in replicating the genogram assignment is to begin by providing a few samples of the variations of an ecomap. Having a few samples in which to pick and choose allows the student to identify one in which will enable them to illustrate their story. It can be as simple as dropping the information into the pre-formatted chart or as intricate as highlighting the multi-faceted dimensions of the student. The instructor in this study stresses that facilitation should be open, with all meaning welcomed and acknowledged by the instructor.

In the remaining weeks of the semester, the instructor assigned an interpretive photo project. Students select a photo that describes a concept or theory covered in class based on what they are currently experiencing. Students then "show and tell," explaining their artistic choices to classmates and answering questions while the instructor acts as a facilitator. In the online environment, students could ask questions of the presenter and use the picture as a representation of a particular theory or concept introduced by the instructor.

These methods serve as an illustration of reflection and reflexive response(s), especially within the context of what is occurring within their environment(s), which often requires an immediate response. The instructor required these tools to be used for three graded assignments over the spring semester.

RESULTS

While the data on this study is still emerging, the instructor experienced high levels of persistence and retention despite the circumstances. The instructor noted enthusiastic participation, with students awaiting the opportunity to connect and share their timely reflections and demonstrate their reflexive response amidst a trauma-responsive situation. The academic department was pleased and supported the integration of digital visualization and online facilitation.

Students are responding positively to incorporating digital visualizations. The course instructor experienced increases in participation and engagement for the remainder of the spring semester. The instructor noted a marked difference in the candor and expressed the needs of the students, with students who participated in the projects reaching out for support and assistance in higher numbers than non-participating students. A goal of the class is to increase the competencies necessary to be successful in the social work certification exam. While certification exam results are pending, there is prior research that suggests these tools are highly useful in understanding and meaning-making. Giovanelli (2017) suggests that when students use visual depictions, they accept more responsibility for the meaning associated with an academic concept. In teacher education, as in social work, the professional socialization and dispositions required to benefit from visually creative outlets (Abegglan et al., 2018).

The instructor found that the assignment not only aids the student, but it also provides documentation of having met the stated objectives of the course. In this study, the assignments align to the core competencies of the discipline, in this case, a social work student must be capable of demonstrating a mastery of the ten core competencies as recommended by the Accrediting Council on Social Work Education (CSWE). This project addresses the stated competency of *applying knowledge of human behavior and the social environment* and aids with ensuring that the social work student is introduced to and familiarized with a method they can use professionally.

Continued assessment will determine the value of the curriculum redesign. Integrating digital visualizations into remote social science classrooms allows for a socio-emotional focus to be integrated into teaching, and in this case, enhanced the experience for both the instructor and the student.

IMPLICATIONS

The satisfaction of students and instructors and the academic department found in this study suggests that educators should consider the use of visual maps and artistic reflection in their coursework. Digital visualizations, such as those used in this classroom setting, allow students to communicate with instructors about the information that matters to them (Giovanelli, 2017). The results of the study indicate that students respond well to visualization exercises that make the theoretical feel personal (McKenna et al., 2019; Yildiz, 2019). Teacher educators can integrate these techniques into their classes using the following steps (Barromi Perlman, 2016):

Table 2
Implementation for Teacher Education Classrooms

Steps	Tools	Questions	Outcome
Organization	*Visual Paradigm* Genograms Ecomaps Syllabus	1. What technologies are the students able to access? 2. What are the costs of using these tools? 3. What are the alternatives for students who lack access?	Students will have equitable access to assignments
Introduction	Syllabus *Visual Paradigm* Rubric	1. How do I create clear guidelines for the assignment (i.e. 2. How difficult is the technology to master?	Students will understand the course requirements

Steps	Tools	Questions	Outcome
Reflection	Syllabus Guided questions Genograms Ecomaps Photography	1. 1. What did you list or photo-graph? 2. 2. Why did you choose this particular notations or image? 3. What were you trying to show? 3. 4. What does this say about how you feel about the concept/theory? 4. 5. How can this be used in the student's classroom?	Students will demon-strate an understand-ing of concepts using visualizations
Facilitation	Lecture Discussion Genograms Ecomaps Photography	5. 1. How do I respond to what is shared by the students? 6. 2. How do I allocate the proper amount of time for the assign-ment and reflections	7. Students will consider their collective un-derstanding of concepts. The instructor will have a data set to understand student progres-sion.
Reflexivity	Journaling	1. 1. How do I make sense of the work based on my own experi-ences? 2. 2. How does this impact the way I respond to student work?	Instructors will con-sider the ways their own bias and under-standing of concepts impact

Using these tools helps students to personalize their understanding of the concepts learned in class, practice and cultivate professionalism using tools often used in their associated professions, and to manage an understanding of the trauma they may be experiencing as a result of the pandemic. Educators can not ignore the social and emotional experiences of learners as separate or inconsequential to the learning environment and student engagement (Baumgardner & Buchanan, 2010). Working with students using tools like ecograms and genograms allows the instructor to be responsive to challenges a student is experiencing, though the instructor must be careful in follow up to ensure the student's comfort.

Digital visualizations provide real-time models of the behaviors they will be responsible for managing in a profes-sional setting. Using these tools requires a focus on facilitation skills to navigate potentially challenging conversations, appropriate methods of organization and dissemination of images, and discernment to understand and follow up on stu-dent responses. Instructors using this method should take care to introduce and appropriate software, set parameters, and be open to the variety of responses that students submit as assignments. Collecting these artifacts provides rich phenom-enological data that should inform future instructional practice.
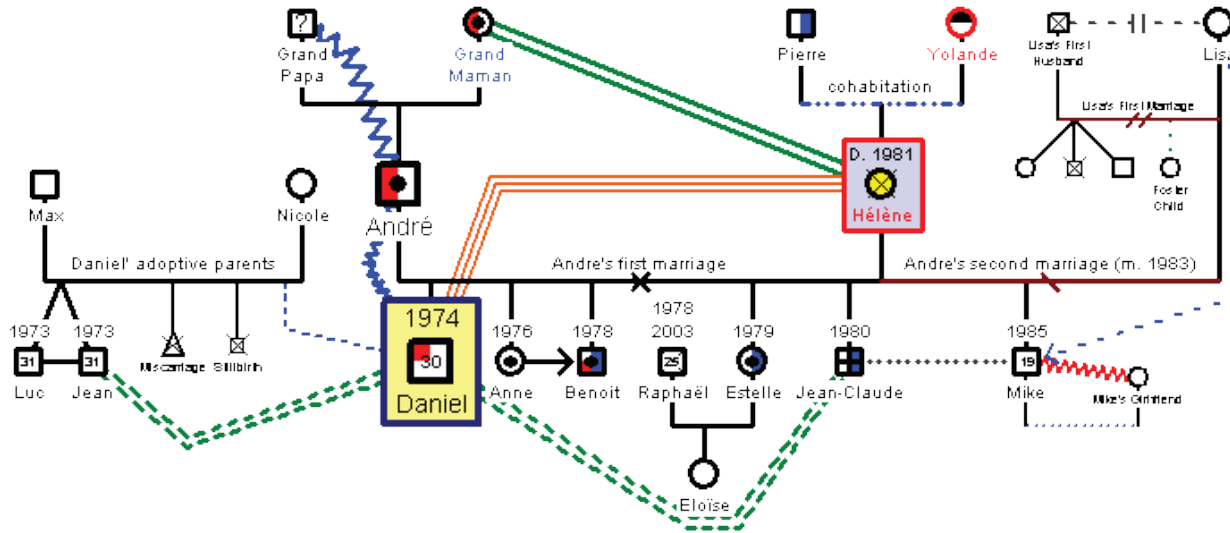
FUTURE RESEARCH

There is a need for additional research and curricular examples that use introspective and retrospective pedagogy in the remote environment, especially in a time of trauma. Research on best practices to provide creative outlets for meaning-making are immediate needs. Ecomaps may support research, assessment, and intervention with other popula-tions. Visual analysis of the images that students choose can serve both as a time capsule and an opportunity for students to release painful emotions while retaining learning. Quantitative analysis of K-20 courses that describe outcomes for students using digital visual reflection methods will help to promote these tools. Qualitative studies that describe the experience and meaning-making derived from these assignments are also necessary. Ultimately, thoughtful approaches offer integral value to students, faculty, staff, and all learners of various digital platforms.

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SAMPLE GENOGRAM

https://www.genopro.com/genogram/

Child's Ecomap

1. Me

I am _____ years old.

Today is: _____

By: _____

3. Social Worker Why?

4.

14. Friends

2.

Why Am I Here?

7. Brothers and Sisters

13. Dreams

11.

I worry about

I feel:

8.

12.

Things I like to do

10.

SCHOOL

9. Things that bug me
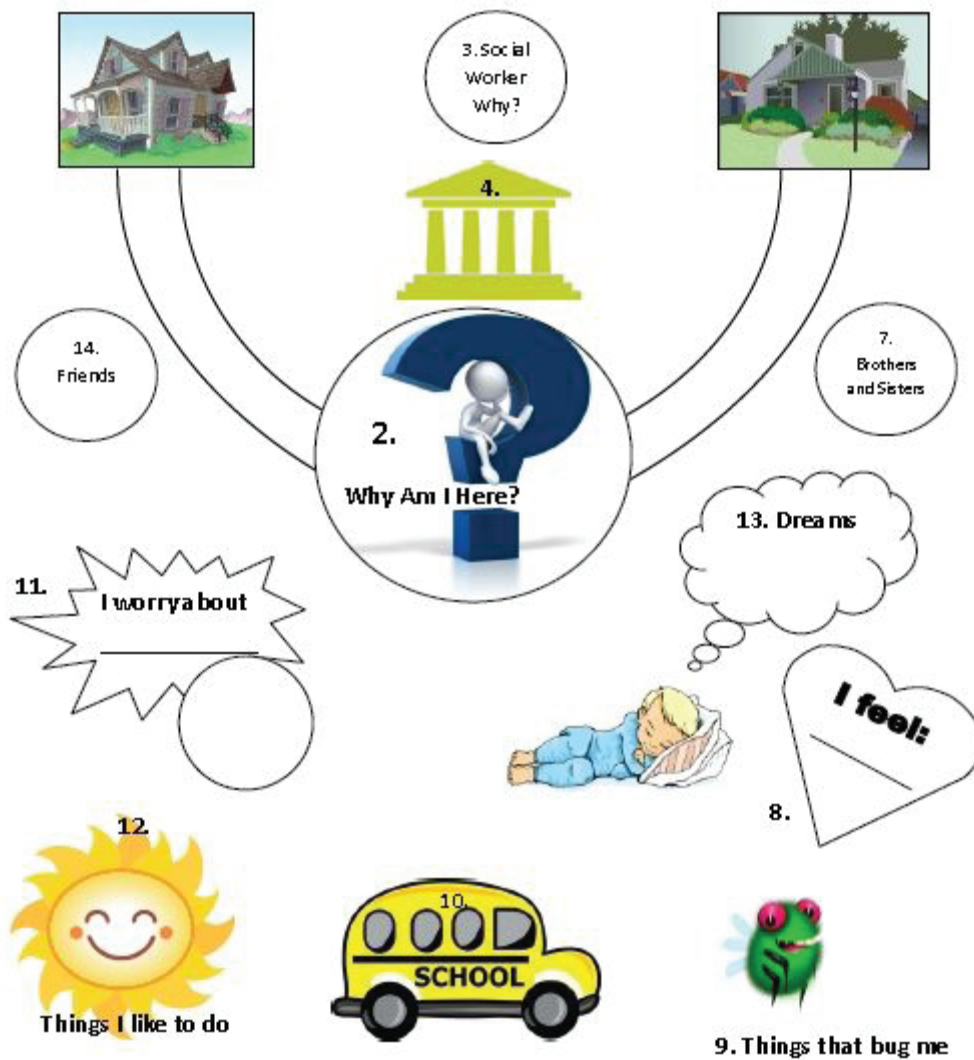
My favorite color: _____

Feels Good

Least favorite color: _____

Does Not Feel Good

The Trap of Technocentrism: (Re)Centering Pedagogy for Emergency Remote Teaching

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We prepared interns for technology integration in face-to-face environments; however, they struggled with the shift to emergency remote learning. Early analysis of observations and interviews indicate that when faced with the overwhelming technological imperatives of online teaching, teacher candidates fell into the trap of *technocentrism*. Even teacher candidates who effectively integrated technology in face-to-face classrooms had difficulty translating that skill to online teaching. In response, we (re)centered pedagogical and content knowledge in our preparation courses and developed resources for online *pedagogies,* instead of a database of online *tools.*

INTRODUCTION

Educational technology has struggled with a tendency toward technological solutionism (Cuban, Kirkpatrick, & Peck, 2001; Harris, 2005; Krutka, Heath, & Mason, 2020; Krutka, Heath, & Willet, 2019; Papert, 1988; Postman, 1992; Watters, 2019). Papert (1988) coined the term *technocentrism* to describe this recurring "fallacy of referring all questions to the technology" (p. 4). Instead of centering complex theories of education and learning, a *technocentric* approach proposes technology as the solution to educational problems. The framework of TPACK (Koehler & Mishra, 2009) represents a particularly well-received attempt to address technocentrism. TPACK re-directs thinking toward a complex and holistic understanding of the "wicked problem" (Mishra & Koehler, 2007) of teaching with technology.

In this time of emergency remote teaching, teacher candidates (TCs) hastily attempted to transfer their understandings of pedagogy, content, and technology to this new online learning environment. Early reports from our TCs indicate that despite a teacher preparation program emphasizing holistic technology integration, they wrestled with moving face-to-face technology integration to an online format. The TCs seem to have defaulted to technocentrism during the shift to remote learning, often looking for "tools" to quickly solve a problem, instead of considering the intersection of pedagogy and technology to support learning. To address this, we used TPACK to guide interventions with our TCs.

INNOVATION

When we observed the TCs in their face-to-face internships, many were incorporating technology in thoughtful ways. We believe this is due in part to our teacher preparation program (TPP) which uses a hybrid approach to teach technology integration (Segal & Heath, in press). TCs complete a stand-alone technology course, as well as learning to integrate technology in their content and literacy methods courses. The courses use TPACK in order to integrate theory and practice for successful technology integration in face-to-face classrooms.

However, the TCs successful technology integration regressed after the shift to emergency remote online classrooms. Many of the TCs were unable to avoid the trap of *technocentrism* (Papert, 1988), and attempted to find technology to

solve the perceived problem of content delivery. Although we have many theories as to why this regression occurred (and we think it will be worthwhile to explore them in future research), we knew that the most important task in the moment was to help them out of the trap. As an intervention, we worked with our students to develop a "Co-Created Menu of Online Pedagogies" (*see Table 1*) which centers pedagogy and content, while still providing a menu of digital tools that TCs can use in the online classroom environment. This database was co-created with our students, and serves as a "living document" for our courses. We believe that this is a useful resource for our current and future teacher candidates, as we anticipate that online education may continue in some format for the near future.

Table 1
Co-Created Menu of Online Pedagogies

Online Pedagogy	**Digital Resources**	**Lesson Use Examples**
Collaboration	Shared Google Slide (https://www.google.com/slides/about/) or Google Document (https://docs.google.com) Google Meeting room (https://meet.google.com) Adobe Spark (https://spark.adobe.com)	Students create an engaging presentation for their classmates through shared collaboration and creative sites. They can share it with the teacher, who can share it with the class, or the students can present it to the entire class. Students work together in a shared document in order to investigate a problem, analyze a concept, or synthesize ideas.
Partner "turn and talk"	Chat box in Google Meet (https://meet.google.com) or Zoom (http://zoom.us)	Create "Chat Rooms" for partners and when asked to share have students break into them. You can jump into each "chat" to see what is being discussed.
Discussion	Padlet (https://padlet.com) Flipgrid (https://info.flipgrid.com/) PlayPosit (https://go.playposit.com/) Perusall (https://perusall.com) Voicethread (https://voicethread.com)	Instead of having students "raise hands" and be part of a larger discussion, break students into groups and let them do a written discussion of the information and comment on each other's posts. Moderate smaller, virtual, "face to face" discussions on flipgrid. Assign small groups to have an asynchronous discussion.
Mind Maps/ Graphic Organizers	Creatly (https://creately.com) Coggle (https://coggle.it) Bubble.us (https://bubbl.us)	During the lesson, students create or complete a graphic organizer and then share it with the teacher. Students work together to create a mind map about a character, a historical event, or scientific process.
Modeling	Camera focused on text, not on teacher Voicethread (https://voicethread.com) Pocket (https://getpocket.com)	Create a voice over PPT to explain a topic or introduce some new information. Model a math problem or annotations using a virtual white board.
Informal assessment	PollEverywhere (https://www.polleverywhere.com) Google Forms (https://www.google.com/forms/about/) PlayPosit (https://go.playposit.com/) Perusall (https://perusall.com)	An online quiz as an exit slip or a poll to see what prior knowledge the students have before introducing a new topic.
Analysis	Perusall (https://perusall.com)	Students annotate, make notes, and highlight information in an online text.

Online Pedagogy	Digital Resources	Lesson Use Examples
Exploration and Inquiry	Wonderopolis (http://wonderopolis.org/) DocsTeach (https://www.docsteach.org)	Students watch science experiments and reactions virtually, and teachers can narrate them. In addition, students can then post their comments, have a discussion, or take a quiz. Students analyze historic primary sources to construct understandings of historic events.
Social and Emotional Learning	PollEverywhere (https://www.polleverywhere.com) Chat box in Google Meet (https://meet.google.com) or Zoom (http://zoom.us) Padlet (https://padlet.com) Slack (https://slack.com)	Starting off the class with a quick poll to gauge their emotional well-being. Poll can be anonymous. Provides students the opportunity to express themselves. Also helps teachers to quickly assess the emotional state of the class. Have students write a quick "poem" based on words that they "found" in a short text that you have them read. The text could be about a current event, a story, a current science exploration, etc., and this gives students an outlet to share their feelings, creative side, and what they find most interesting out of the text. Quick check-in with students and their parents to see how they are doing and what they might be having difficulty with either it being school or other. Provide a forum for "random" class chatter that may be off topic, but allows for community building. A chat thread for TV shows, sports, funny TikToks, etc.

RESULTS

Early findings indicate that re-focusing attention toward pedagogy and content will be necessary to ensure TCs' success in online teaching spaces. Through our menu of online pedagogy and our technology infused preparation program, we anticipate that we can better support our TCs during this time *and* whenever we return to face-to-face schooling. Further, the insights from the findings suggest the need for a clearer method to connect TCs' existing TPACK (Koehler & Mishra, 2009) for face-to-face teaching to the TPACK necessary for online instruction. This is supported by an earlier study which suggests that accessing existing TPACK schema supported teacher development of online pedagogies (Ward & Benson, 2010).

IMPLICATIONS

As we move into the summer and fall semesters, we highlight two important learnings from this experience that can inform our strategies in teacher education and technology integration. Our first early learning is: *When faced with the overwhelming technological imperatives of online teaching, teacher candidates fall into the trap of "technocentrism"* (Papert, 1988). The TCs reported that the technology tools they used in their face-to-face internships were not easily integrated into a fully online experience. Early analysis suggests this is because the TCs were overwhelmed by the tremendous and rapid undertaking of shifting to online teaching. This combined with their own struggles to discern what pedagogies best supported learning in an online environment.

For example, TCs shared that one of their greatest concerns was "getting the content out online," rather than considering the *how* of teaching and learning the content. As a result, they frequently relied on Voicethread because they were able to upload a video or slides and lecture through the work. This suggests we may need to (re)center and focus on the intersection of pedagogy and content knowledge in our preparation courses to support face-to-face, hybrid, and fully online teaching. Further, future interns may benefit from a database of online *pedagogies*, instead of a database of online *tools*. It also suggests that novice teachers may lack a deep professional schema of PCK (Shulman, 1987), preventing

them from making a more fluid shift from face-to-face to online instruction. Certainly the TK is necessary to technology integration, but our early findings suggest that it was the lack of PK that particularly impeded TCs' transition to online teaching.

Our second early learning is: *Teacher candidates who effectively integrated technology in face-to-face classrooms are not readily translating that skill to online teaching.* Several TCs took a more nuanced approach to pedagogy, attempting to integrate applications that allowed students to participate remotely. They chose Padlet and PollEverywhere (tools they integrated in their face-to-face internships) in their online teaching. Yet, the interns ultimately concluded that the technology was not helping with the aim (e.g., content knowledge) or needs of their online lessons. In this time of crisis, they and their students were craving connection and interaction. In this emergency transition, neither the pedagogies nor the technologies were provided the teaching and learning that the students needed. This may be because in the crisis situation of emergency remote teaching, "normal" (non-crisis) pedagogies are less imperative than those pedagogies that are informed by upheaval and unsettling of the norm. We suggest extra emphasis on care and connection and technologies that support this.

FUTURE RESEARCH

As we move forward through the summer and fall, we anticipate the ways in which TCs will add to the document. We have also created contingency plans for our own courses, so that we may model best online pedagogy and practices. Furthermore, we intend to emphasize the importance of pedagogy and student-centered learning, no matter the environment.

This experience has raised several significant questions for us that merit further exploration. In particular, we are curious about the TCs' regression to *covering* content online instead of *teaching* content online. Is this due to their novice status in the profession? That is, would a more master teacher still fall back on the old standard of "chalk and talk," given the pressures of emergency online teaching? Is there a relationship between the pressures that teachers feel to "cover" content and the trap of technocentrism (Papert, 1988). Finally, we plan to maintain communication with our TCs as they transition to their new roles as in-service teachers in the fall.

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