Digital Connections: Supporting Part-Time Teacher Educators Teaching with Technology Through an Online Community of Practice

by

Jodie L Donner

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Graduate Supervisory Committee:

Ray R. Buss, Chair
Danah Henriksen
LeeAnn Lindsey

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ABSTRACT

To address national technology standards for PK-12 educators and accreditation requirements, Mary Lou Fulton Teachers College has developed an approach to preparing its teacher candidates by infusing technological learning experiences in its preparation programs. Faculty members have been expected to teach with technology, model various levels of technology integration, and provide their students with appropriate learning to develop their digital pedagogy skills. Part-time faculty members have been responsible for teaching courses with these requirements but often lacked access to professional development opportunities and support. The lead technology strategist in the college determined these part-time instructors needed improved strategies for knowledge development, support, and networking. Thus, an online community of practice was created as a potential solution to this problem of practice. This mixed methods study examined how part-time instructors participated in an online community of practice (OCoP) housed in two digital platforms, Canvas and Slack. Elements of the OCoP included learning sessions and resources based upon the Teacher Educator Technology Competencies (TETCs), the Technological Pedagogical Content (TPACK) framework, and elements integral to communities of practice. The investigation included measuring the influence of the OCoP on participants' technology knowledge, technology skills, technology use, and technological self-efficacy. Participants were part-time faculty members responsible for teaching courses in various teacher preparation programs in the college. Data from the study included survey data, Canvas and Slack analytics describing use, lesson analyses and observational notes, and interviews. Results suggested the OCoP was an effective intervention for the purpose of providing digital connections for part-time faculty to develop professionally with respect to teaching with technology. Participants displayed an increase in TPACK, TETC, and self-efficacy

construct scores and demonstrated development in technology knowledge, technology skills, technology use, and technological self-efficacy. The discussion focused on describing the complementarity of the quantitative and qualitative data, explaining the findings in relation to the literature, and presenting limitations, implications for practice and research, lessons learned, and conclusions.

DEDICATION

To my family for their understanding, support, and patience during this process and always. To my dad, Gene, who has instilled in me a value of education and a dedication to do something right or not do it at all. He also taught me 'nothing's ever easy,' so I (mostly) knew what I was getting into when I applied to this program. Although my mom is not here, my hope is she would be proud. To my kids, Maddie and Bergen, I hope my perseverance serves as a model for you to realize you will accomplish amazing pursuits of your choice. I never felt I was an absentee mom during this program. If you felt that, you never told me, but I have time to listen now, so let's hear it. Finally, to my husband, Lee, who has done everything to support my educational endeavors even when it meant he had to take on pretty much all of the responsibilities I shirked. Amidst all of that he also remodeled half of our house and did all of the amazing husbandly things he always does. I love you and am grateful for your relentless support. This chapter (well, these five chapters) closes another section in our story together. I look forward to writing the next few chapters with you.

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Somehow it all seems to go back to that time my best friend, Crazy Jenny, talked me into applying for a master's degree program in educational technology. Actually, I have no reason to sugar coat it. She actually bullied me into doing it. After all, we don't call her 'the instigator' for nothing. She dropped out of after one class meeting, but I had never dropped a class and certainly was not going to start then. My parents taught me to always finish what I started. That left me without Jenny in the program that wound up introducing me to a passion that has influenced my teaching and learning experiences since.

In her own memorable and usually comical way, Crazy Jenny sent me on this path that has led to my finalizing my dissertation and earning my doctoral degree. This path has included lifechanging opportunities like having Dr. Alice Christie as a mentor, changing careers from teaching English to operating as a media center director to training colleagues as a technology integration specialist to leading IgnitED Labs. Whether in K-12 or higher education, my purpose has remained steadfast as I have committed my work to transforming educational experiences with technology.

I am grateful for the connections I have developed and the community I have cultivated in this process. Dr. Ray Buss has been a constant support who has led me through every step. Having him as my chair has been a comfort and a privilege. My committee members, Dr. Danah Henriksen and Dr. LeeAnn Lindsey, have contributed their expertise, ideas, and guidance. I appreciate their roles as researchers whom I hope to emulate. Dr. Teresa Foulger encouraged me when I applied to this program, and I am thankful for her support. Dr. Punya Mishra contributed ideas and assisted with my intervention. I have appreciated knowing I could share ideas with him and learn from him. He knows a little about one of my theoretical frameworks, too. Dr.

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Crazy Jenny pushed me onto this path and is still one of my best friends. I have been fortunate enough to add two more best friends due to this program. Robert, we may not work together anymore, but our connection will continue. I will always be happy to be a pain in the ass if that's what the situation requires. The next Foo Fighters show has our names written on some tickets. Serena, you have been my person through this. I have attempted to fill that role for you and hope I have been half as amazing as you. Your optimistic outlook gives me the perspective I need. Forget all that researcher stuff. I am just a better person because of you. Uff da. I love you!

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CHAPTER 1

LEADERSHIP CONTEXT AND PURPOSE OF THE STUDY

John Dewey (1956) described the role of a teacher as one comprised of challenges:

> His [the teacher's] problem is that of inducing a vital and personal experiencing. Hence, what concerns him, as teacher, is the ways in which that subject may become part of experience; what there is in the child's present that is usable with reference to it; how such elements are to be used; how his own knowledge of the subject-matter may assist in interpreting the child's needs and doings, and determine the medium in which the child should be placed in order that his growth may be properly directed. He is concerned, not with the subject-matter as such, but with the subject-matter as related factor in a total growing experience (p. 23).

Nearly a quarter into the 21st Century, the role has remained much the same as teachers foster students' growth and knowledge construction. Consistent with sound practice, teachers have related their instruction to students' pre-existing knowledge of the content to assist those students in creating individualized experiences. The greatest difference today has been the availability of technology for both teachers and students. The 'child's present' and accessible 'medium[s]' have come to include a vast array of advanced technological tools, modalities, and methods. Therefore, teachers have had to learn how to leverage these means to guide students while developing knowledge with these resources, regardless of the subject areas.

To address this changing learning environment, replete with technological tools and myriad related instructional methods, national standards are in place to guide teachers as they develop pedagogy to achieve student learning goals. Likewise, programs preparing educators for the field have methods exemplifying the

expectations set forth by national and local guiding entities. Attending to these requirements, then, is of importance for all teacher preparation programs, including the institution in which I work. Thus, what follows are details about the expectations and the relevance to and influence on the local context.

National Technology Standards for PK-12 Teachers

Nationally-recognized PK-12 standards that addressed technology in education have directed teachers as they prepared students' learning experiences. Current teachers in the field have followed these guidelines to meet educational technology learning goals, which included using technology for instruction and assessment as well as standards geared toward them and their students. In 2017, the International Society for Technology in Education (ISTE) presented an updated version of educator standards focused on educators as learners, leaders, citizens, collaborators, designers, facilitators, and analysts (ISTE, 2017). This change came after the organization's 2016 transformation of the student standards which identified seven areas related to student-centered technology exploration and use (ISTE, 2016). Similarly, the Common Core State Standards, adopted by the majority of the states in the country, called for students to demonstrate a variety of technology-supported skills in mathematics and language arts as they prepared for college and future careers (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010). Finally, a report completed by the Office of Postsecondary Education included a finding that 36 states had standards in place that were specific to teaching with technology (U.S. Department of Education, 2016). Consequently, integrating technology into teaching has become an integral element of the learning landscape.

To address these changing standards, seasoned educators have adapted their methodologies and understandings as they have learned how to integrate technology

into their lessons by engaging in various methods of professional development. Those who have been in the field have had experiences to build upon and have used technologies to transform their instructional delivery and assessment (Allan et al., 2010; Doering et al., 2009; Ertmer & Ottenbreit-Leftwich, 2010). A primary foundation for that work came from the Technological Pedagogical Content Knowledge (TPACK; Mishra & Koehler, 2006) framework. Educators with well-developed knowledge in their content areas and pedagogical strategies used TPACK to consider how to weave in technological strategies to supplement their already effective instruction (Allan et al., 2010; Doering et al., 2009; Ertmer & Ottenbreit-Leftwich, 2010; Niess, 2011; Olofson et al., 2016). By comparison, what about the teacher candidates (TCs) who were learning about the teaching practice? TCs are students preparing to enter the teaching profession after graduation and upon receipt of educator certification. The preparation programs on which TCs have depended to learn how to become teachers have evolved to ensure that graduates obtained the skills necessary to integrate technology. Thus, as technologies have changed, so have the instructional practices of teacher preparation programs.

National Standards and Expectations of Teacher Preparation Programs

Producing teachers who knew and were able to meet the technology standards in their teaching required within PK-12 classrooms (serving students from pre-kindergarten to grade 12) has become an important component for the programs preparing those future teachers. A report from the Council of Chief State School Officers (2017) indicated teacher preparation programs were to align their content standards with PK-12 standards. That organization's Interstate Teacher Assessment and Support Consortium (InTASC) developed standards for teacher preparation programs. The 10 standards included 26 references to integrating technology in the areas addressing the learner and learning, content knowledge,

instructional practice, and professional responsibility (Council of Chief State School Officers, 2013). Additionally, the latest program standards from the Council for the Accreditation of Educator Preparation (2013) required teacher educators to use appropriate technology applications while instructing preservice teachers and obliged TCs to integrate technology with their content and pedagogical knowledge.

Moreover, the United States Department of Education, Office of Educational Technology (OET, 2016) provided additional guidelines, which directed programs to take steps to ensure TCs were "prepared to meaningfully incorporate technology into their practice immediately upon entering the classroom . . . trained by faculty using technology in transformative ways . . ." (p. 4). The OET issued this directive while recognizing a large number of teachers who have recently graduated reported lack of confidence in implementing technology integration when they first began teaching. The OET addressed expectations for those who were teaching TCs and stated teacher educators must have had their own knowledge and experiences with educational technologies, and those experiences must have included professional development opportunities to assist them in staying current and confident with the evolving technologies related to teaching. A final call to action included an expectation for instructors to have "regular exposure to and experience with teaching and learning technologies and strategies relevant to online, blended and face-to-face environments and their affordances and constraints" (OET, 2016, p. 18).

Teacher educators, who were already committed masters of their content areas and pedagogical methods, have required opportunities for professional development and support necessary for technology integration. Their charge has been to stay current in a fast-paced educational discipline which likely was not their area of expertise. They have had the task of sharing and transferring those experiences as they prepared tomorrow's teachers. They did this to ensure there

would be "no uncertainty of whether a learner entering a PK-12 classroom or college lecture hall will encounter a teacher or instructor fully capable of taking advantage of technology to transform learning" (OET, 2017, p. 40). These instructors have needed focused and relevant learning experiences to assist them in identifying their strengths and deficient areas. Foulger et al. (2017) developed the Teacher Educator Technology Competencies (TETCs) for teacher educators to identify areas on which to focus and inform professional development opportunities for those creating and providing the experiences. Knowledge of these competencies and access to related learning has been expanding and will continue to be necessary for all instructors in teacher preparation programs, whether full-time, part-time, or new to those teaching in such programs.

Local Context

For over three years, I have worked as the sole technology strategist (formerly referred to as technology infusion specialist), serving all faculty members and instructors of Arizona State University's Mary Lou Fulton Teachers College (MLFTC), which includes one of the largest teacher preparation programs in the nation. My mission has been to continue the technology infusion efforts that began in the college ten years ago. Technology infusion has served as the model developed within MLFTC in which technology integration experiences are part of specific methods courses required in the teacher preparation programs (Foulger et al., 2019). Technology integration has been focused on the use of technologies in schools to help students create knowledge (Belland, 2009) and included the blending of technology with pedagogy and content knowledge (Mishra & Koehler, 2006). From the beginning, the goal of this model has been to prepare confident and capable educators who integrated technology into their teaching. This undertaking has been aligned with the national standards and with requirements of the Arizona

Administrative Code. In its role of overseeing preparation programs, the Arizona State Board of Education has provided program approval to educator preparation programs that appropriately and adequately address national standards in areas such as educational technology. The Arizona policy specified that programs preparing teachers must incorporate technology into their instructional strategies in ethical and appropriate ways (Arizona Administrative Code Supplement, 2018).

I have benefitted from the groundwork my predecessors completed. Prior technology infusion specialists and instructors in the college proactively infused technology into the methods courses (Buss et al., 2015, 2018; Foulger et al., 2015; Foulger et al., 2019; Wetzel et al., 2014) to provide appropriate learning experiences that prepared graduates to be ready to teach with technology in their future classrooms. These efforts continued beyond the coursework in the college while mentors supported these future teachers as they implemented their technological practices during their student teaching (Buss et al., 2018; Lindsey et al., 2016). Instructors worked with the previous technology infusion specialists to practice and gain confidence when teaching students how to integrate technology during their methods coursework. This plan produced some positive results, and some elements have been effective in helping instructors to prepare teacher candidates to use technology effectively in their future classrooms.

Despite these achievements, some areas of concern have merited revision and improvement with respect to current implementation of the technology infusion processes. One of the biggest challenges I have addressed has been that I have served as the sole technology strategist; whereas, in an earlier time, two full-time and one part-time staff members shared the responsibilities and were required to provide greater levels of service. Working within the constraints of being the sole technology strategist, I have been concerned with identifying how I can have the

greatest influence and reach the largest number of faculty members and instructors possible. Limitations I have encountered included lack of time for full-scale professional development, communication issues, and limited administrative support.

Further, large numbers of faculty associates (FAs) serving as part-time instructors, late hiring practices, and instructor turnover have affected the technology experiences provided to TCs in their courses. FAs have served as instructors who have taught three or fewer courses within the college and who often have had full-time employment in addition to their part-time teaching loads with MLFTC. This category of instructors includes those who take on the role of lead instructor, often with limited planning time, as secondary to full-time work commitments. This group of instructors has faced disadvantages and frustrations when teaching because their full-time colleagues viewed them as lacking professionalism, lacking skill, and being without determination to improve their practices (Kezar & Sam, 2011). FAs, as adjunct or part-time, receive minimal compensation and often face feelings of exclusion due to limited interactions with their full-time counterparts. Additionally, these instructors frequently do not have experience integrating technology into their teaching and do not have the technology infusion background of other faculty members. According to data collected between fall 2018 and spring 2020, FAs taught an average of 25.59% of the teacher preparation courses offered (J. Hanley, personal communication, February 27, 2020). An increase of FAs in the college in the fall of 2020 moved that percentage to 37.82% as 239 of 632 total teacher preparation sections were staffed by FAs during the term (J. Hanley, personal communication, January 6, 2021).

Moreover, current and new, both part-time and full-time, instructors have not experienced the high-level opportunities related to technology infusion provided to those faculty members and instructors who were with the college during the earlier

technology infusion transition because no systematic orientation or sustainability processes were developed for subsequent application. Therefore, the student learning experiences provided by more recently hired instructors may not have matched that of instructors who received past technology training and sustained, continued development. As a result, teacher candidates may not have experienced the instruction and modeling required for them to graduate 'ready to teach with technology.'

I identified another concern as I reviewed the course development shells for all technology-infused courses within the Blackboard learning management system, which was in use by the university through June of 2019. This review included an examination of course syllabi, course assignments, and supplemental course materials. Some courses consisted of learning technology in isolation, rather than as an embedded, almost invisible element related to teaching and learning, as outlined in the Technology, Pedagogy, and Content Knowledge Framework (TPACK) (Herring et al., 2016; Kolb, 2017; Mishra & Koehler, 2006; Shinas et al., 2015). Learning aligned with TPACK has been essential because it has supported teacher candidates as they developed their abilities to create and deliver efficient technology-integrated instruction (Foulger et al., 2015; Herring et al., 2016; Niess, 2015). I discovered the courses were missing required elements related to this development. These missing pieces included a lack of explanation or careful linking of the technology to course objectives or content-related instruction. In other words, the pedagogy was not evident. Some technology appeared to be added-on to the learning rather than being necessary for learning. Also, thorough documented support for instructors new to the courses was not evident in some course shells, support necessary for instructors who may have had limited levels of technology competence. Some assignments had a focus on the technology tool rather than the learning processes or pedagogical

reasons for the assignments. Bakir (2016) argued TCs should have analyzed why they used technology tools and should have chosen to integrate technology only if the tools were aligned with the learning. Additionally, using technology should have resulted in relevant and authentic learning (OET, 2017). Another shortcoming was an absence of evidence that instructors delivered the content with relevant technologies. Results from previous studies indicated TCs needed to experience their instructors modeling the educational technology (Bakir, 2016; Kirschner & De Bruyckere, 2017).

Through my service as a lead member of the professional development committee in the college, I was able to gain insights into the support instructors needed as compared to what they received. For example, we surveyed faculty members to gauge interest in learning topics and delivery methods. The results indicated instructors preferred online options related to technology integration as well as in-person opportunities focused on educational technology use. In response to the need, and to address the lack of instructor support, I have been creating and providing a variety of virtual, online professional learning modules and face-to-face, in-person trainings for instructors. Nevertheless, those modules and trainings have not been offered within the contexts of the specific courses. Participation was optional for online or in-person offerings. Instructors chose to engage with the online modules through a collaborative Blackboard course at a higher rate than attend the face-to-face sessions, according to data I collected in the fall of 2017. An average of 16 instructors engaged with the online modules and trainings. The in-person professional development sessions I presented did not have high participation because attendance was optional, and the times may not have 'fit' the instructors' varying schedules. An average of seven instructors attended the multiple in-person workshops I offered (out of a total of over 100 faculty members). Although I have

had more success with some of the required trainings for small instructor groups (i.e. instructors within a program or teaching a specific course), and working with some instructors individually, I know I was not reaching enough of them. I likely have not engaged those who needed the most support—new and part-time instructors not initially-involved in the technology infusion conversion. These instructors were most likely to be uncomfortable, unsure, and lack confidence in teaching with technology. Even if they did feel confident, they may not have known about the tenets of TPACK and the research surrounding the experiences TCs should have had to prepare for technology integration in their classrooms. The implications are that teacher candidates may have received inferior or incomplete technology-related instruction.

Another concern I identified was new and part-time instructors have had mixed 'onboarding' experiences and access to resources for teaching. My membership in the professional development committee has evolved into a collaboration with some faculty associates, clinical professors, and program strategists surrounding a mentorship program for this targeted group. I have learned that some new instructors spent a great deal of time just trying to learn how to implement basic skills associated with the learning management system and coursework. Thus, they may then have begun their efforts with impediments that prevented them from more appropriately developing technology integration skills for their courses. For example, those who were new to technology-infused courses may have committed time to dealing with administrative detail issues rather than developing knowledge and skills related to technology infusion elements of the courses. These new instructors also received inconsistent levels of support from course coordinators, the leaders they looked to in order to learn how to teach this sometimes-challenging content. These issues became magnified when the college began its transition from Blackboard to Canvas, a new learning management system,

fully implemented in June 2019. For some, learning the new system has consumed their time and prevented them from spending more effort on actually integrating technology into their courses.

To better understand the perceived needs of new and part-time instructors and begin to consider how to support their professional learning, I interviewed three faculty members in the fall of 2018. Two were part-time instructors who had taught in the college before, and the other was a full-time instructor in her first semester with the college. All instructors obtained assistance from various colleagues, but they all reported wanting and needing more support. The college has used course coordinators, lead instructors who have been expected to provide all faculty members teaching a particular course with the support, training, and knowledge needed to deliver the course. The three instructors interviewed received inconsistent support from their course coordinators. The implication is some course coordinators may not be supporting all instructors, and if others do not step up to fill that gap, some new and part-time instructors may lack support.

The instructors interviewed cited a need for learning, collaboration, and idea sharing. However, they all commented on the lack of dedicated and directed time for this. Part-time instructors did not receive invitations to in-person faculty meetings and often could not attend anyway because they frequently had other obligations during the faculty meetings. Some full-time instructors may have wanted to attend in-person professional development, but they may have had conflicts with meetings or teaching responsibilities. The three instructors commented that establishment of a community would allow for information exchange, and they all recognized this was a missing piece for them. They discussed the positive influence this would have on their teaching and their confidence. Due to constraints within instructors' schedules and the college's structures and locations, in-person collaboration might not be

feasible for creating such a community. However, an online community might be an effective solution.

Clearly, part-time instructors expected to effectively deliver instruction with integrated technology use need directed and reliable support. Professional learning opportunities, networking, and teaching direction are necessary to assist them as they engage their students and endeavor to model technology integration, explain technology integration, and prepare their students for implementing technology into teaching. Without those elements in place, FAs may unnecessarily falter, which results in student experiences that may not match national or local expectations and standards.

Intervention—a Brief Introduction

Providing FAs with a central location that includes resources, professional learning opportunities, and networking with other instructors might be a way to support part-time instructors' technology integration. Located online, this approach would break down barriers such as distance and time and address what FAs said they needed: paths for collaborating and sharing ideas with instructors teaching similar courses with similar needs. A proposed vision for the online community, its components, and its influence on the participating FA at the center of the graphical representation has been presented in Figure 1.

Figure 1

Online Community of Practice

Note. This figure depicts the FA at the center of the online community of practice with access to professional learning resources regarding TPACK, the TETCs, and technology integration. Access to these resources and collaborating with other instructors may influence FAs' technology integration skills and self-efficacy.

Purpose of the Study and Research Questions

Thus, the purposes of this mixed methods study were to (a) explore how part-time faculty members within a teacher preparation program participated in an online community of practice and (b) describe the effects of an online community of practice on part-time faculty members' knowledge, skills, use, and self-efficacy associated with technology integration. The following research questions guided the study.

> RQ 1: How and to what extent do part-time faculty members participate in an online community of practice for the purpose of collaborating about technology integration?

RQ 2: What are part-time instructors' perceptions of their participation within an online community of practice as related to their integration of technology?

RQ 3: How and to what extent does the implementation of an online community of practice for part-time teacher preparation instructors who are infusing technology into their courses affect their technology (a) knowledge and (b) skills?

RQ 4: How and to what extent does the implementation of an online community of practice for part-time teacher preparation instructors who are infusing technology into their courses affect their (a) technology use and (b) self-efficacy?

CHAPTER 2

THEORETICAL PERSPECTIVES AND RESEARCH GUIDING THE PROJECT

Chapter 1 included an introduction to the context, a discussion of the purpose of the study, an overview of reconnaissance details, and an introduction to an online community of practice as a strategy to address the problem. I began this chapter with a review of related research. Specifically, topics included curricular requirements within programs that prepare teachers, teacher educators' professional development needs for meeting the requirements, and the special conditions experienced by part-time instructors who are teaching within those programs. Thereafter, I provided a discussion of related literature about the theories guiding the study and implications of that literature. Finally, information acquired from previous cycles of action research and the implications derived from them closed the chapter.

Teacher Preparation Programs

Teacher preparation programs have been obliged to provide appropriate experiences to teacher candidates (TCs) to teach with technology. To meet this outcome, professional development (PD) for teacher educators (TEs) has been an important part of such efforts. PD must have (a) been designed to meet teacher educator needs, (b) provided ongoing support, (c) been collaborative, and (d) been accessible (Buss et al., 2015, 2018; Foulger et al., 2015; Wetzel et al., 2014). This was especially necessary for part-time and new faculty members within MLFTC who may not have had the technology integration knowledge and skills necessary to deliver appropriate instruction to achieve goals associated with technology-infused courses.

> No new teacher exiting a preparation program should require remediation by his or her hiring school or district . . . This expertise does not come through the completion of one educational technology course separate from other

> methods courses but through the inclusion of experiences with educational technology in all courses modeled by the faculty in teacher preparation programs. (U.S. Department of Education, Office of Educational Technology, 2017, pp. 35-36)

Teacher preparation programs have had the responsibility of providing students with learning experiences that ensured those students exited the programs ready to direct their own classrooms. Moreover, technology integration has increasingly been considered an integral part of leading the classroom (Kirschner & De Bruyckere, 2017; Tondeur, et al., 2016). To achieve this outcome, instructors have had to provide opportunities for TCs to learn about and apply educational technologies (McCulloch, et al., 2018). Further, instructors' modeling of technology use has been an influential part of that learning process (Admiraal et al., 2017; Clark, et al., 2015). Notably, administrators and faculty members who have directed these programs have made progress toward developing the abilities of the TCs with respect to teaching with technology (Buss et al., 2015, 2018; Shinas, et al., 2015). For example, consistent with findings from Tondeur et al. (2012), some institutions have moved away from the single standalone technology course and infused technology into their programs through various courses, resulting in system-wide change (Foulger et al., 2015). Nevertheless, even with innovative approaches such as these, TCs nationally and locally have been completing teacher preparation programs without the knowledge and skills necessary to effectively and confidently teach with technology (Bakir, 2015, 2016; Clark, et al., 2015; Tondeur, et al., 2016). Clark et al. (2015) determined TCs incorporated technology into their teaching but did not understand how it applied to students' learning. Kirschner and De Bruykere (2017) found that although TCs may have grown up with digital technologies, they demonstrated they were incapable of managing those

technologies while teaching. As a result, instructors must have provided TCs with authentic and relevant experiences, in context, to more appropriately develop technology integration abilities (Kaufman, 2015).

Teacher Educator Professional Development Needs

Sustainable, practical PD has been a necessary requirement of effective technology integration (Cheung & Slavin, 2012; Hegedus, et al., 2014; Killion, 2016; Kirschner & De Bruyckere, 2017; Levin & Schrum, 2013). Nevertheless, providing PD for instructional faculty members within education programs has been a challenge due to faculty turnover, part-time faculty participation, limited PD opportunities, and the lack of required participation in PD at some institutions. Even so, instructors have had to familiarize themselves with emerging technologies, model use of those technologies, and provide opportunities for teacher candidates to practice using these technologies (Bakir, 2015; Uerz, et al., 2018). Still, the national call to action has been, "Teachers need to leave their teacher preparation programs with a solid understanding of how to use technology to support learning" (OET, 2017, p. 35). Thus, instructors must have had that understanding first to model it and thereby transfer it to TCs.

PD offerings have varied in terms of their availability across teacher preparation programs. Although appropriate PD has been considered to be integral to the development and improvement of teacher educators' effective and innovative uses of educational technology (Uerz, et al., 2018), formalized and consistent opportunities have not often been in place, which has left the responsibility to instructors to learn it on an ad hoc basis (Kosnik, et al., 2015). Improving their practice was necessary; yet, they often were required to identify their own paths for professional growth and engagement in the opportunities they located (Loughran, 2014). Providing appropriate technology integration opportunities for their TCs has

been a goal to meet various teacher preparation standards; therefore, teacher educators have sought their own educational technology PD experiences. This individual PD approach occurred because teacher preparation program leaders have struggled to provide effective PD for instructors (Hadar & Brody, 2016; Loughran, 2014; Patton, et al., 2015).

Many teacher preparation program innovations have addressed the challenge of providing educational technology PD with varying results (Bakir, 2015, 2016; Tondeur et al., 2012). Of particular interest has been how new faculty members and part-time faculty members have learned, collaborated, and remained proficient with evolving technological tools and technology-infused teaching methods. Because they have often worked in isolation in different locations, they have not continually had opportunities for face-to-face professional learning and collaboration.

Time, knowledge, and ability have also been constraints. Uerz et al. (2018) conducted an analysis of literature related to the needs of instructors who have been preparing TCs to teach with technology. Four aspects of the PD became evident. Effective PD has (a) been associated with instructors' pedagogy, (b) included collaboration among disciplines, (c) been targeted to individual educators' unique needs, and (d) involved reflection (Uerz et al., 2018).

Due to the rapid changes in technology, determining the appropriate content of PD has been challenging. Foulger, et al. (2017) recognized this issue, which led to their development of the TETCs for teacher educators. In their work, Foulger et al. identified twelve constructs related to the knowledge, skills, and aptitudes required of instructors. To illustrate, (a) designing instruction that incorporates content-specific technologies, (b) using online tools, and (c) using technology to differentiate instruction were three of the 12 constructs required of teacher educators to prepare TCs to integrate technology effectively into their instruction. All competencies

identified by Foulger et al. have been provided in Table 1. Taken together, these contributions have provided initial direction for PD appropriate for teacher educators. The competencies and related criteria have provided a direction for PD goals and a mechanism for measuring TEs' technology knowledge and skills as related to technology integration.

Table 1

Teacher Educator Technology Competencies

Competency	Related Criteria
1. Teacher educators will design instruction that utilizes content-specific technologies to enhance teaching and learning.	a) Evaluate content-specific technology for teaching and learning. b) Align content with pedagogical approaches and appropriate technology. c) Model approaches for aligning the content being taught with appropriate pedagogy and content.
2. Teacher educators will incorporate pedagogical approaches that prepare teacher candidates to effectively use technology.	a) Model using technology for accessing, analyzing, creating, and evaluating information. b) Assist teacher candidates with evaluating the affordances of content-specific technologies to support student learning. c) Assist teacher candidates with the selection and use of content-specific technologies to support student learning. d) Facilitate opportunities for teacher candidates to practice teaching with technology.
3. Teacher educators will support the development of the knowledge, skills, and attitudes of teacher candidates as related to teaching with technology in their content area	a) Support teacher candidates' alignment of content with pedagogy and appropriate technology. b) Provide opportunities for teacher candidates to reflect on their attitudes about using technology for teaching and for their own learning. c) Provide opportunities to develop teacher candidates' efficacy about using technology in teaching.
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.
5. Teacher educators will use technology to differentiate instruction to meet diverse learning needs.	a) Design instruction using technology to meet the needs of diverse learners. b) Demonstrate using assistive technologies to maximize learning for individual student needs.

Table 1 Continued

Teacher Educator Technology Competencies

Competency	Related Criteria
5. Teacher educators will use technology to differentiate instruction to meet diverse learning needs.	c) Model using technology to differentiate learning in teaching and learning. d) Provide opportunities for teacher candidates to create learning activities using technology to differentiate instruction.
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.
8. Teacher educators will use technology to connect globally with a variety of regions and cultures.	a) Model global engagement using technologies to connect teacher candidates with other cultures and locations. b) Design instruction in which teacher candidates use technology to collaborate with learners from a variety of backgrounds and cultures. c) Address strategies needed for cultures and regions having different levels of technological connectivity.
9. Teacher educators will address the legal, ethical, and socially-responsible use of technology in education.	a) Model the legal, ethical, and socially-responsible use of technology for teaching and learning. b) Guide teacher candidates' use of technology in legal, ethical, and socially-responsible ways. c) Provide opportunities for teacher candidates to design curriculum following legal, ethical, and socially-responsible uses of technology.
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.

Table 1 Continued

Teacher Educator Technology Competencies

Competency	Related Criteria
11. Teacher educators will engage in leadership and advocacy for using technology.	a) Share a vision for teaching and learning with technology. b) Engage with professional organizations that advocate technology use in education. c) Seek to influence the opinions and decisions of others regarding technology integration. d) Assist teacher candidates in becoming advocates for using technology to enhance teaching and learning. e) Support teacher candidates in understanding local, state, and national technology policies in education.
12. Teacher educators will apply basic troubleshooting skills to resolve technology issues.	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.

Note. Adapted from "Teacher Educator Technology Competencies," by T. S. Foulger, K. J. Graziano, D. Schmidt-Crawford, and D. A. Slykhuis, 2017, *Journal of Technology and Teacher Education*, *25*, pp. 432–433.

Part-time and New Instructors' Needs

The number of adjunct or part-time instructors in university settings has been increasing, and the most recent comprehensive report indicated that 49.2% of faculty members are part-time (Coalition on the Academic Workforce, 2012). Although these instructors may have not had the benefit of structured and consistent PD, especially in the area of educational technology, their course loads have included content requiring the integration of technology. Curtis et al. (2016) found part-time instructors held perceptions that full-time instructors do not respect their contributions. As adjunct instructors have grappled with feelings of inferiority, they have often done so in isolation, which has resulted in their need for specialized,

consistent, and easily-accessible support (Dolan, 2011; Hadar & Brody, 2010; Webb, et al., 2013). Part-time instructors have often been unable to attend PD sessions during regularly-scheduled faculty meetings because of their primary work obligations (Diegel, 2013; Webb et al., 2013). Traditional PD and face-to-face meetings have not successfully served part-time faculty members; therefore, flexible and innovative support methods may be warranted to serve better this population (Santisteban & Egues, 2014).

Implications of Related Research

The responsibilities of instructors who are preparing future teachers are multi-faceted, and educational technology is a necessary but difficult element to provide in teacher preparation courses. The best method for providing instructors support to meet these needs is still unknown. Nevertheless, various researchers have defined factors related to effective PD for teacher educators (Foulger et al., 2018: Uerz et al., 2018). Further, understanding the unique experiences and requirements of part-time and new instructors will be necessary to ensure TCs are experiencing appropriate instruction to contribute to their development of technology integration skills. Current models and traditional PD methods have not been successfully meeting the needs of all teacher preparation program instructors. Therefore, an innovative design has the potential of improving PD and support practices for instructors who are integrating technology into their teacher preparation courses.

Theories Guiding the Research

Three relevant theories guided this study. First, the Technological Pedagogical Content Knowledge (TPACK; Mishra & Koehler, 2006) framework provided a foundation that has been used to assist instructors in understanding and teaching technology integration. In previous research, instructors and TCs have been shown to apply the framework as they were developing their understanding of how

technology intertwines with teaching skills and content knowledge (Wetzel et al., 2014). Second, social learning theory seemed to be a powerful framework. In particular, Bandura's (1977, 1997) work on self-efficacy and self-regulation appeared to be particularly relevant. Third, Wenger's (1998; Wenger et al., 2002) work on communities of practice (CoPs) appeared to be an effective way to sustain those participating in PD. Notably, it was anticipated CoPs would provide support for instructors as well as opportunities for identity formation and participation with others who have just learned technology integration skills. Online CoPs have been emerging as methods for connecting community members who were spread across teacher preparation sites and who did not have time to collaborate in person (Dorner & Kumar, 2016; Smith, et al., 2017). Thus, online CoPs offered various options for sharing resources and supporting each other during learning and growth.

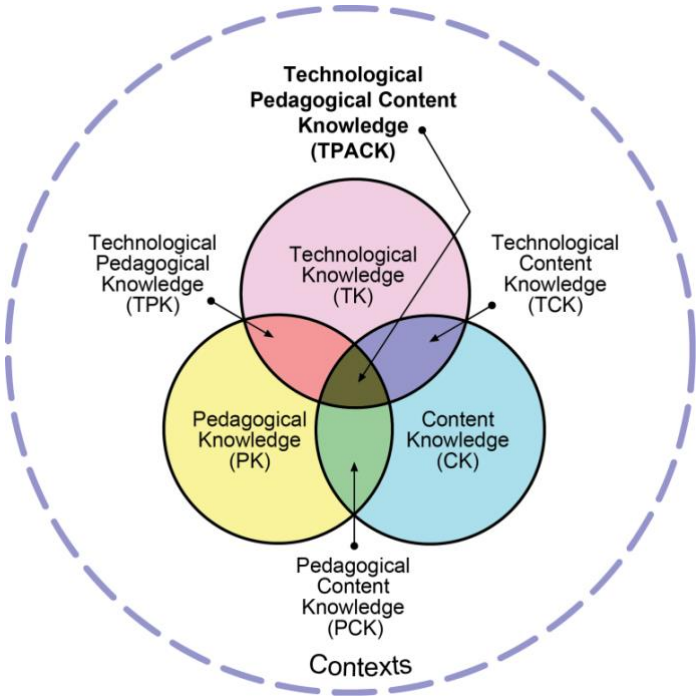
Technological Pedagogical Content Knowledge Framework

Mishra and Koehler (2006) expanded Shulman's (1987) previously identified essential knowledge for effective teaching framework. In their work, Mishra and Koehler suggested teaching with technology was composed of content, pedagogy, and the combination of those two domains (called pedagogical content knowledge and referred to as PCK), along with knowledge of technology to develop their TPACK framework. Mishra and Koehler posited all three components (TPCK) were interdependent and essential to effective teaching with technology. As depicted in Figure 2, Mishra and Koehler included technology as integral to teachers developing PCK. Mishra and Koehler proposed seven distinct domains were part of TPACK and enhanced Shulman's model through the addition of "three pairs of knowledge intersection and one triad" (2006, p. 1026). The resulting domains they referred to were content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK), technology knowledge (TK), technological content knowledge

(TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPCK). CK was focused on the subject matter the teacher was teaching, such as mathematics. PK described the methods which the teacher used to create and implement instruction. PCK was the knowledge that combined content and instruction. TK represented the technology knowledge of the teacher and included basic technologies such as writing materials and advanced technologies such as digital applications. TCK, then, represented knowledge of subject matter and its connection with technology and included the use of content-specific applications to teach the content (e.g. using a mathematics application to teach geometry). TPK represented the knowledge of available technologies for teaching such as knowing about an application that provided students with methods for annotating online texts. Finally, TPCK included all of the other types of knowledge and represented effective teaching with technology. Mishra and Koehler (2006) described all domains as intersecting and influencing each other. Understanding the complex relations, they theorized, was central for teachers to address the complicated elements involved in classroom technology integration.

Figure 2

Technological Pedagogical Content Knowledge Framework



Note. This figure demonstrates the interconnections of the TPACK domains. Retrieved from http://tpack.org. Used by permission.

Further, Mishra and Koehler (2006) explained that context influenced the three elements and their intersections. The most important aspect of the framework was providing teachers ways to see how the three primary domains overlapped and interacted as they taught with technology. This "analytic lens for studying the development of teacher knowledge about educational technology" (Mishra & Koehler, 2006, p. 1041) provided educators with a new approach to unpacking the complex nuances associated with integrating technology into already effective teaching processes and content information. Mishra and Koehler recognized the importance for this framework for beginning teachers as well as experienced educators and specifically suggested teacher preparation leaders adopt TPACK as an outcome for their programs.

After the introduction of TPACK, educational researchers leveraged the tool to assist teachers in developing their knowledge and abilities related to integrating technology. Doering et al. (2009) viewed the concept as an effective way to deconstruct the problematic areas of incorporating technology into classroom instruction and referred to it as a "possible solution" (p. 322). The researchers analyzed how social studies teachers learned to integrate technology using an online learning platform. The participating teachers learned about TPACK, experienced the online modules, and took part in PD training that included developing a foundation in TPACK. Doering, et al. used a Likert scale to assess teachers' TPACK knowledge before and after the PD experience and gathered qualitative data by interviewing teacher participants. Results revealed that TPACK changed over time and teachers' knowledge in the different domains increased, especially the technological domain. The researchers called TPACK a progressive and easy-to-understand framework that "proved to be a metacognitive tool for teachers . . . helping them visualize how their technology knowledge and skills work in tandem with their other knowledge domains about teaching and learning" (Doering et al., 2009, p. 334). Additionally, they found teachers engaged in powerful, metacognitive processes as they thought about and visualized their knowledge within the TPACK framework while they considered their abilities and areas that needed improvement. In conclusion, Doering et al. deemed the model to be useful for guiding teachers in evaluating and developing their instructional methods related to technology integration.

TPACK has been especially informative for instructors in teacher preparation programs who have been teaching their students how to combine technology with pedagogy and content. Shinas et al. (2015) examined how preservice teachers' domains within TPACK changed when taking coursework aligned with the theory. Shinas et al. used the Survey of Preservice Teachers' Knowledge of Teaching and

Technology (Schmidt et al., 2009) to collect TPACK quantitative data from 299 preservice teachers who were all taking an educational technology course. They found TCs had to recognize technology was another critical element of teaching that could not remain in isolation when considering teaching as a whole. Results also showed the connections among the constructs, from which they concluded TPACK was an informative model that assisted TCs' integration of technology (Shinas et al., 2015). Further, the authors discussed the importance of having theory to assist TCs when learning to add technology to teaching, and they identified TPACK as a bridge used by TCs to transform theory into practice.

Instructors of TCs have experienced growth that has influenced their teaching after they have analyzed TPACK. Foulger et al. (2015) collected qualitative data from four instructors who were infusing technology into methods courses within their college of education. Those instructors collaborated with a technology infusion specialist to learn about TPACK through PD and applied TPACK when infusing curriculum and assignments with technology. Data came from focus groups conducted prior to the instructors teaching the newly-designed courses and after having taught the courses three times. Foulger et al. found the instructors' experiences with TPACK induced a "mind shift" (p. 138) when considering technology integration and noted instructors' perceptions of infusing technology changed after they considered how technological, pedagogical, and content knowledge came together. Further, these changes affected instructors' notions of teaching TCs about the connections between technology and content. When instructors first started to incorporate technology into their courses, they had reservations about the added element, but that changed because, "They began viewing technology infusion through the TPACK lens, which appeared to produce a deeper understanding of what was required to help their teacher candidates realize the power of technology within

content" (Foulger et al., 2015, p. 141). The researchers concluded TPACK was a dynamic model that strengthened instructors' understanding of technology integration, which then helped them teach their TCs how to connect technology with pedagogy and content.

Results from several other studies were similar and confirmed the power of the TPACK framework. Voogt and McKenney (2017) identified TPACK as a tool teachers have used to untangle the knowledge required for technology integration. Albion et al. (2015) found TCs benefitted from the framework and its application to their teaching. Finally, numerous researchers have discussed the need for PD to support and guide instructors to use and teach the TPACK framework to their students with confidence (Foulger, et al., 2015; Uerz et al., 2018; Voogt & McKenney, 2017).

Implications. Incorporating TPACK into PD and support models for instructors in teacher preparation programs is necessary, as identified in various studies (Niess, 2011; Pamuk, 2012: Scherer et al., 2018). The TPACK framework provides a powerful representation for all educators. Instructors must know and understand it prior to teaching it to TCs. Instructors who have interpreted and analyzed the domains of TPACK understand how technology fits into their teaching. Then, they can assist TCs in developing the same kind of knowledge about TPACK. The research clearly demonstrates TPACK is a necessary and effective part of learning to teach with technology. Therefore, including the construct in PD and support structures for instructors and exploring their understanding of it is critical. Likewise, multiple variations of validated TPACK instruments exist (Abbitt, 2011; Schmidt et al, 2009), which have informed a portion of the survey instrument used for measuring TEs' growth related to understanding and implementing technology integration.

Social Learning Theory and Self-efficacy

Social learning theory (SLT) has been a prominent theory explaining how people create meaning through experiences of interacting with others. Bandura (1977) described human behavior as a series of interactions among circumstantial, observable, and cognitive influences. At the core of the theory was the notion that "people are neither driven by inner forces nor buffeted by environmental stimuli. Rather, psychological functioning is explained in terms of a continuous reciprocal interaction of personal and environmental determinants" (Bandura, 1977, pp. 11-12). Bandura clarified learners attained knowledge by observing the behaviors and related consequences of others, which meant they have no need to test the experiences for themselves, yet they still learned. Moreover, modeling was an especially important part of the theory because Bandura found learners could watch others and transform those observations into creative and new behaviors. Another integral element was self-regulation, which identified learners as selecting and organizing influences rather than simply reacting to those from the environment. Self-regulation affected learners' abilities to create their own paths of action after seeing behavior and choosing what to enact and how to perform (Bandura, 1977, 1997). Further, Bandura (1986) noted people have implemented self-regulatory skills by using self-incentives to expand their knowledge and abilities. In 1977, Bandura predicted that communication technologies would lead to the development of on-demand observational learning via modeling, creating more opportunities for social learning to affect the development of knowledge and skills.

Bandura (1977) developed the elements of the self-efficacy framework by introducing perceived self-efficacy, which was people's judgments of their competencies to affect a situation. The basis of the concept was that people constructed beliefs about their abilities to perform specific actions with levels of

success by testing and generating behaviors through continued effort (Bandura, 1986). People chose to attempt actions based upon their self-efficacy because they deemed an outcome was attainable or it was not (Bandura, 1977). Additionally, the effort people were willing to expend on a task derived from efficacy expectations. Therefore, "the stronger the efficacy or mastery expectations, the more active the efforts" (Bandura, 1977, p. 80). Bandura (1977) identified the sources of information from which people developed their perceived self-efficacy. Those sources of information were (a) performance accomplishments, (b) vicarious experiences, (c) verbal persuasions, and (d) emotional arousals.

Studies exploring self-efficacy and educational technology have been prevalent in the literature. Alrushiedat and Olfman (2014) conducted a case study to explore how an anchored asynchronous, online discussion influenced students' self-efficacy and learning assessment results by comparing a group that participated in anchored online discussion with a group that used standard online discussion. They gathered data from students' use of the discussion boards. Students in the study wrote essays about their experiences, which provided additional data. Students who reported increased self-confidence noted the increases were due to their interactions in the anchored online discussions, which the researchers interpreted as increased self-efficacy. Alrushiedat and Olfman shared evidence showing that the students who participated in the anchored online discussions referred to higher feelings of confidence and improved performance in their essays. Additionally, those students had significantly higher examination scores when compared to those who participated in the online discussion without anchoring. The researchers concluded higher self-efficacy led to students who expended more effort, and thus performed better on the examination. Considering the results of this study, self-efficacy appeared to be a factor to consider in online interactions and learning experiences.

Abbitt (2011) investigated how the TPACK model affected TCs' self-efficacy beliefs with respect to teaching with technology. Participants included 45 preservice teachers in a pre-test-post-test design who were enrolled in a technology integration course during their teaching internships. Abbitt used the Survey of Preservice Teachers' Knowledge of Teaching and Technology (Schmidt et al., 2009) to collect participant TPACK data. For self-efficacy data, Abbitt used an instrument developed by Wang et al. (2004). Participants responded to both surveys before the course began and at the close of the course. Abbitt concluded TPACK knowledge was potentially predictive of self-efficacy beliefs with respect to integrating technology. Further, instruction and improvement about TPACK may have increased self-efficacy for preservice teachers (Abbitt, 2011). Abbitt determined when preservice teachers learned about the relations between the TPACK domain of technological knowledge with pedagogical and content knowledge, they perceived their abilities to teach with technology as improved. Thus, based on Abbitt's work, there appeared to be a strong connection between TPACK and self-efficacy.

Hardy et al. (2017) examined the influence of part-time university instructors' self-reported levels of self-efficacy on six areas of teaching in an online environment: (a) teaching satisfaction, (b) subject matter preparation, (c) student success, (d) student learning, (e) institutional support, and (f) plans to keep teaching. This quantitative study included 79 participants, identified through convenience sampling, who completed the General Self-Efficacy Scale, the Scale of Perceived Social Self-Efficacy, the College Teaching Self-Efficacy Scale, and the Self-Monitoring Scale. Results showed instructors who believed they had institutional support had higher reported self-efficacy. The researchers also found a positive correlation between teaching satisfaction and all self-efficacy measures and a positive correlation between instructors' perceived preparation to teach their content and their general

self-efficacy. Further, instructors' beliefs about mastery and teaching competency "predicted most of the explicit beliefs in key aspects of the teaching profession" (Hardy et al., 2017, p. 55). The implications of this study are important with respect to support that is available to part-time instructors. If instructors have institutional support and resources to improve their knowledge and support their teaching, it is anticipated they may have higher levels of self-efficacy.

Tseng and Kuo (2014) used the SLT framework to determine which factors affected instructors' knowledge sharing in the largest online community of practice (OCoP) for teachers in Taiwan. Researchers interviewed 49 members of the OCoP using a semi-structured interview protocol. Subsequently, they developed narratives based on the interview responses; then they developed a survey based on the narratives. They shared the survey with all members and discarded incomplete responses and those from participants who were not current teachers. Based on an analysis of the resulting data from 321 respondents, Tseng and Kuo found members shared knowledge more frequently because of network ties within the OCoP and their commitment to assist due to a "prosocial commitment to helping others" (p. 44). Instructors' personal self-efficacy beliefs directly affected their willingness to share with the group to help others and improved the quality of the PD in the OCoP. Tseng and Kuo suggested facilitators of OCoPs ensured participants were able to share information without judgment from others and encouraged knowledge sharing to improve confidence, which then affected self-efficacy. The researchers claimed this was critical because self-efficacy beliefs influenced instructors' commitments to provide support and request support from peers in this type of community. Thus, self-efficacy beliefs are clearly an integral part of the success of an OCoP. Moreover, an online community of practice is a medium that provides instructors with the

support and resources they need. Further, in the intervention being developed, instructors will need to contribute and share knowledge with each other.

Implications. Results from studies investigating self-efficacy demonstrate participants who learn in online environments experience positive benefits, including improvements in self-efficacy. Participants with increased levels of self-efficacy believe they will be successful when engaging in those same or similar actions in the future. Thus, those faculty members who are integrating technology might be more willing to use technology and model for their students after having increased self-efficacy beliefs. Additionally, instructors who have higher levels of self-efficacy are more apt to participate in idea-sharing, a necessary component of an OCoP. The research related to technology integration and self-efficacy, then, indicates that instructors who have opportunities to gain self-efficacy from supportive online spaces may integrate technology frequently and with effectiveness. Additionally, as they increase their experiences teaching with technology and building confidence in their abilities, they will likely share their successes with others in an OCoP. This could be an effective network of learning for part-time instructors. Various instruments designed to measure educators' technology integration and self-efficacy are abundant in the literature (Karam, et al., 2018; Scherer, et al., 2017; Wang et al., 2004) and have contributed to the development of a section of the instrument used in this study to measure TEs' self-efficacy.

Communities of Practice

Wenger (1998; Wenger et al., 2002) developed communities of practice (CoPs) from his research (see also Lave & Wenger, 1991). Wenger (1998) claimed, "We all belong to communities of practice" (p. 6). Further, he suggested the essential dimensions of CoPs were (a) a domain, (b) a practice, and (c) a community (Wenger, et al, 2002). The domain included the shared knowledge of the community

members that resulted in common identity, purpose, and accountability. The practice was how the community operated and included what its members knew, how they shared that knowledge, and how they continued or maintained the sharing through tools, frameworks, and artifacts. The community was the structure that supported members' learning, interacting through relationships, and mutual belonging and engagement. Specifically, Wenger (1998) described members of CoPs as having a shared enterprise or domain, developing their identities through learning experiences, and participating through practice within their communities over time. CoPs, then, were the loci for knowledge creation, meaning making, and negotiating identity and belonging. Members moved in and out of CoPs, and all members, new and old, learned in a CoP because "A history of mutual engagement around a joint enterprise is an ideal context for . . . leading-edge learning, which requires a strong bond of communal competence with a deep respect for the particularity of experience" (Wenger, 1998, p. 214).

Over 20 years after Wenger's seminal work on the framework, a new perspective emerged by considering the relation between communities and technology (Wenger, et al., 2009). This new view of CoPs in digital environments included four areas influencing the connections between communities and technology: (a) connectivity, (b) modes of engagement, (c) geographies of community and identity, and (d) the social nature of the web medium. Wenger et al. (2009) noted that some CoPs learn together in combined physical and digital spaces. Additionally, as technologies developed, several CoPs have existed only in digital habitats. The role of technology steward has become an important part of CoPs that functioned and learned in digital spaces. Those who have served in this capacity have had a "responsibility and a practice—an attitude as well as the conversations, decisions, and learning that address the design and management of a community's

technology infrastructure" (Wenger et al., 2009, p. 33). Members have been able to sustain engagement over time because of the connection options available through technology. The association between communities of practice and technology has transformed pathways for reification and participation because the digital habitats have resulted in different types of contributions by CoP members. Digital habitats themselves have become sources of identity for the CoPs. Participating in community learning has become more convenient and more accessible. Reifying related artifacts in one digital space has become easier to manage and organize. Wenger et al. (2009) noted technology has produced tensions among members and community because individuals interacted with technology on their own, instead of within the group. Further, technology has resulted in individuals having memberships in many CoPs due to ease of access, which could affect their levels of participation. Even so, technology has also been a useful tool in helping to manage those issues for CoPs.

Several studies have been conducted using a CoP lens to view and examine educators' professional learning. For example, Patton and Parker (2017) explored how physical educators participating in CoPs viewed their interactions as supportive of their PD. In all, 36 international teacher educators were members of CoPs. Data from interviews resulted in two emergent themes, which Patton and Parker identified as "a) three-legged stools: better together than apart, and b) unleashing professional growth" (p. 354). Participants supported one another as they collaborated around their shared commitment. Their self-efficacy increased, and they reported they had more enthusiasm for individual and group professional learning. Scheduled and unplanned interactions were important for individual and group growth. Notably, not all CoPs in the study shared physical space so CoP participants used technologies to communicate and support one another. CoP members agreed they learned from participating in these spaces because they faced no judgment, but

experienced challenging 'pushes' from other members who sparked their thinking around the common enterprise. Patton and Parker determined CoPs had been able to address the isolation some instructors experienced, and thus, these communities afforded opportunities for these instructors to develop a sense of agency. The findings also supported the notion that educators who were brought together around a common focus supported and encouraged one another, which served as a form of PD.

Researchers have conducted numerous studies about OCoPs. Macià and García (2016) reviewed related studies to explore teachers' participation in online networks, both formal and informal, and analyzed the learning structures, theoretical frameworks, and the effects on teachers' professional learning. After locating relevant articles, the researchers narrowed their review to 23 studies from 99 and completed a thorough thematic analysis. They determined teachers who participated in specific online conversations, with guidance and support, reported increased professional development and self-efficacy. Notably, the platform and digital tools used to support the OCoPs affected participation. Macià and García found participation varied based on both medium and applications involved. Moreover, they identified methods for fostering interactions, such as encouraging members to participate, improving teachers' digital abilities, and using a facilitator to moderate the interactions. Just as individuals have participated in CoPs to overcome isolation, the researchers found the same to be true for members of OCoPs. Essential to their findings, these researchers noted real evidence of professional growth had not been included in the studies, and the effects on student learning were also lacking. Clearly, educators who participated in OCoPs chose to do so for various reasons and attained positive results. Additionally, their abilities to use technology and the digital tools in the OCoP affected their participation. The potential for professional learning

and building community, in addition to moving beyond feelings of isolation, existed in these networks.

Karam et al. (2018) used a case study design to investigate teachers' participation in OCoPs. They gathered data from K-12 STEM (science, technology, engineering, and mathematics) teachers who were members of two online science-teaching communities. They distributed two surveys, one year apart. Karam et al. analyzed the data to determine how teachers participated in collaborative efforts, how participation changed over time, how the participation resulted in sociotechnical capital, and how participation and sociotechnical capital predicted self-efficacy for the science teachers. Results showed one predictor of participation was the lack of close physical access to local peers. Moreover, those who participated in activities with other CoP members four or more times reported they had a more positive teaching climate, more situated knowledge, and strengthened group identity and obligation. Notably, the researchers found sustained participation was not evident, and CoP members were 'in and out' of the OCoP. Karam, et al. suggested a cohort or membership model might encourage continued participation. The researchers suggested additional research would help to determine whether sustained participation was necessary and by whom to improve job outcomes. They also mentioned 'lurking or passive engagement' deserved further consideration to determine how this behavior may have led to community membership for those who engaged this way. Finally, they concluded additional research was warranted on the effect of teachers' participation in CoPs and how that influenced teaching practices.

Implications. With respect to implications related to the research about communities of practice, the context in which the online interactions occur must be supportive and judgment-free as well as analytical in a positive, supportive way. Members must challenge each other to reach higher levels of thought and practice.

Also relevant is the notion that CoPs can be productive and overcome physical distance. Finally, instructors who find themselves physically separated from colleagues have the potential to learn and grow when participating in a CoP that appropriately leverages technologies.

Further, the respectable rates of participation in an OCoP for teachers who did not have local peers is important to note. This indicates providing and facilitating an OCoP for instructors who are situated in isolated workspaces without access to colleagues for in-person collaboration may serve as an effective way to meet their professional learning needs with respect to integrating technology into their teaching. Additionally, studying the potential effects for instructors who may exhibit passive membership in an OCoP also may be beneficial.

Similar findings were obtained by researchers conducting other studies that have viewed teacher interactions using the CoP lens. Members of CoPs have shared knowledge (Phillips, 2017), and participation in these communities has promoted professional development, especially for higher education faculty members (Kosnick, et al., 2015). Notably, Peeraer and Petegem (2012) claimed that using digital technologies to sustain and facilitate CoPs for the purpose of teacher educators' professional learning "seems to offer the best hope . . . for continuing development" (p. 1052). Some researchers agree but have noted more research regarding OCoPs and their relation to PD is necessary because the influences of teachers' participations in these digital communities on their professional growth is limited (Bostancioglu, 2018; Tseng & Kuo, 2014).

Previous Cycles of Research

I conducted a pilot study in the spring of 2019 to gather data about instructors' participation in an OCoP. Five participants were members of the OCoP within the Canvas learning management system from mid-February to mid-April.

Two participants were new FAs who were teaching for the first time in MLFTC. One was a new full-time faculty member. Another was a veteran FA, and finally, the last participant was a veteran full-time, clinical professor. I used purposive sampling to identify those instructors who fit identified criteria. Specifically, they were all new and veteran full- and part-time instructors, were teaching one or more courses labeled as technology-infused (with some teaching the same courses or with previous experience teaching the courses), and had a mix of levels of experience with technology integration. Their introduction to the OCoP was a screencast I recorded that served as a tutorial showcasing the content of the OCoP and guiding their use of the space.

The OCoP featured learning modules I created about the foundational elements of technology integration based on TPACK (Mishra & Koehler, 2006) and practical implementation of technology integration based on the Triple E Framework (Kolb, 2017). I created discussion areas for general idea-sharing, Canvas-related resources, and questions. Further, I created discussion groups aligned to all of the courses the participants were teaching, which was a total of four. Additionally, at various points during the OCoP, I posed discussion questions and suggested pedagogical technology uses through announcements. I addressed two research questions:

RQ 1: How and to what extent do instructors who are infusing technology into teacher preparation courses participate in an online community of practice?

RQ 2: What do instructors participating in an online community of practice perceive as beneficial to their teaching?

I gathered and analyzed quantitative data from Canvas that displayed the levels of participation of the educators in the OCoP. Reviewing the analytics from Canvas illustrated participants did not use the course-specific discussion boards but

did participate in the idea-sharing discussion. Additionally, the average total time spent in the OCoP was 19:22 minutes. The average page views of participants was 42.67. One participant (Lisa—pseudonym) engaged far more than the others, and she spent two hours and 40 minutes in the OCoP and viewed 462 pages. Due to the skew attributed to Lisa, her data were not included in the averages.

I also interviewed four participants to gather qualitative data. The themes that emerged from the interviews were (a) improving the OCoP experience, (b) benefitting from the OCoP, (c) desiring human connection and relationships, (d) considering student benefits, (e) implementing OCoP content in teaching, and (f) discussing lack of participation in OCoP. The two users who were most active in the OCoP shared examples of integrating content from the OCoP into their current teaching or plans to use what they learned in future semesters. The two active members were teaching the same course and were both FAs. One was a new FA, and the other was a veteran FA who had taught with the college for over two years. In general, participants noted the importance of human connection and relationships when collaborating and learning together. Nearly all participants interviewed mentioned this component would improve the OCoP. Two participants who did not actively use the OCoP cited their age and comfort levels as the reasons.

An important integrated finding that emerged from considering the quantitative and qualitative data together revolves around Lynn (psuedonym). She spent 26 minutes total in the OCoP and contributed once. By considering that data, I concluded she may not have benefitted from the OCoP. Combining that with her interview data, however, revealed she appreciated the OCoP, learned much, and gained new ideas. She and another participant, Lisa, had a collaborative relationship in place that existed outside of the OCoP. I discovered, by analyzing both interviews, they were discussing OCoP content using other methods outside of the OCoP. They

met in-person, used email and text, and talked on the phone about incorporating learning from the OCoP into their courses. Understanding that these connections existed and attempting to leverage them or move them into the OCoP is important. Without the qualitative data to reveal this, I would have not considered these outside communications.

Based on my findings from the spring 2019 study, I modified and expanded the OCoP within Canvas to gather data during the fall of 2019. As a member of a mentoring group for FAs teaching in teacher preparation programs at MLFTC, I realized I could invite all FAs to participate in the OCoP, regardless of their course assignments. In other words, rather than targeting FAs teaching technology-infused instructors, I could include all FAs, and they might benefit and participate. I could then analyze the data related to those instructors' technology integration. I developed a new course shell in Canvas, called an organizational shell, and included some of the same content. For example, I embedded the technology integration foundational module focused on TPACK (Mishra & Koehler, 2006) and Triple E (Kolb, 2017) used in the previous cycle. Adding all FAs allowed me to introduce them to the shell in person during an already-scheduled teaching orientation, which I co-presented in August. Therefore, prior to their courses starting, they all had access to the OCoP, a short training overview, and the in-person introduction. This was a way for me to address the need for human connection that participants mentioned in the previous cycle.

I used purposive sampling to recruit participants. The total number of participants was 53. Participants included all FAs, all mentors (a mix of veteran full- and part-time faculty members), and various veteran, full-time faculty members who either agreed to join or asked to join.

In an attempt to encourage participation, I developed a detailed introduction page with links to multiple areas of content. For example, a section titled "Technology Integration Tools and Strategies" featured pages with resources for (a) technology literacy, (b) enhanced pedagogy with Canvas, (c) digital collaboration, (d) active learning with technology, (e) digital communication, (f) digital creation, (g) digital citizenship, and (h) digital differentiation for diverse learners. Within each page, I included resources ideas and links, and a shared, interactive document that allowed users to add links of their own.

I collected data during the last three weeks of the fall semester in November and December. The quantitative data came from a post-intervention instrument, and a retrospective pre-intervention instrument, which I used Qualtrics to create. Both instruments have been provided in Appendices A and B, respectively. I shared the instruments with participants through the Canvas shell with one week between distributions of the post-intervention survey and the retrospective, pre-intervention survey. The results have been provided in Table 2. A limited number of instructors completed the surveys (post-intervention: n = 12, retrospective, pre-intervention: n = 10).

Table 2

Retrospective Pre-Intervention and Post-Intervention Means and Standard Deviations

Variable	Retrospective Pre-Intervention	Post-Intervention
TPACK Construct	4.35 (0.58)	4.95 (1.11)
TETCs Construct	3.91 (0.76)	4.36 (1.24)
Self-efficacy Construct	4.30 (0.68)	4.71 (1.36)

Note. For retrospective pre-intervention n = 10. For post-intervention n = 12. SDs are in parentheses.

Analysis of the data showed the means were higher for the post-intervention survey. These reasonable gains supported the outcomes that were anticipated. These findings are directing my research as the results indicated the intervention may have influenced instructors.

The open-ended responses on the post-intervention instrument and three interviews with FAs provided qualitative data. The post-intervention instrument included questions such as "How much time did you spend in the online community of practice each week" and "What did you learn from the online community of practice?" Two participants responded to the open-ended items by stating they were hesitant to contribute due to lack of confidence or because others were not contributing. Additionally, three participants noted they needed reminders or alerts and more information about locating the online community of practice. For the interviews, I asked questions focused on instructors' technology use and use of the OCoP. For example, I asked, "How did you use technology in your teaching?" Another question was "How did components of the online community of practice influence your use of technology in your teaching?" Four themes emerged from the interview responses. The themes were (a) identifying useful resources, (b) discussing instructional practices, (c) considering instructional frameworks, and (d) focusing on factors affecting use. All participants discussed their uses of the resources as well as shared ideas of the resources they would prefer to have. For example, Bonnie (a pseudonym) discussed which resources she used in the OCoP and said, "I loved all of the video . . . . I found it to be extremely valuable to me." Mindy (a pseudonym), on the other hand, mentioned what she thought was lacking in the OCoP, ". . . another thing that might be used, and I think I asked a question, like if there's a list of things [technology tools] . . ." Related to instructional practices, participants shared their thoughts. Wanda (a pseudonym) said she found "different ways to include different

technologies." Bonnie spoke specifically about instructional frameworks, like TPACK and said, "We talked a lot about TPACK. . . . If it's not purposeful . . . not aligned with the concept or the skill or the topic, then I'm not just putting a video in to say I put a video in." Interview responses revealed much about participants' reasons for accessing the OCoP. Bonnie said she used the OCoP because "I want to become more efficient." She had predetermined goals to address. Wanda accessed the OCoP, though, when reminded. She said she visited the OCoP because, "I loved the emails that you sent . . . reminding us of 'hey, this resource is available' or 'if you have questions about this on Canvas' . . . . that was really helpful."

The quantitative and qualitative data from the fall of 2019 informed future next steps of my intervention. I determined the intervention was influencing FAs by considering both types of findings. Further, the results provided me direction and considerations for content and delivery that I would not have known without gathering the data. This second cycle of the OCoP, then, confirmed the intervention had potential. The data helped me to identify elements needing adjustment, and participant responses were integral in clarifying what those elements were and how I could improve them and the intervention's structure and resources. For example, participants indicated they needed more details about locating and viewing the OCoP.

Implications

There are several implications. First, change the orientation for the OCoP to address the need for details about locating the OCoP. To facilitate this, I should add written instructions and a recorded screencast that will explain and show participants how to access the OCoP. A second implication is to provide participants with reminders about the OCoP. I will add more frequent email reminders and other notifications to encourage participation. Third, based on participants' suggestions, I will include the types of resources they liked and used, including more videos.

Fourth, I will include a list of all technology applications with details and access links. Finally, I will add a component to the OCoP to provide more natural networking opportunities and promote discussion among participants. This may help FAs connect and share and develop their confidence, which could lead to more contributions from them.

Summary of Implications Related to Literature and Previous Research Cycles

Supporting instructors in appropriate and effective ways as they prepare TCs to integrate technology in teaching is challenging. Research results support the need for employing innovative methods to provide PD for all instructors, especially those who are new and/or part-time. Further, research about effective PD and OCoPs points to these methods as ways to fulfill the need. Notably, Bandura's (1977) prognostication of technologies influencing modeling and hence knowledge and skill development has become reality, especially with web-based video platforms and recorded tutorials. Likewise, relationships between students' and instructors' technology integration knowledge and self-efficacy are informative (Abbitt, 2011; Alrushiedat & Olfman, 2014). Leveraging an online environment that includes video examples, video and chat collaboration tools, knowledge exchanges, artifacts, and immediate connections is a promising way to engage and support instructors who work in isolation, lack technology integration foundational knowledge, like TPACK, and desire professional learning opportunities to affect instruction of TCs. Building and facilitating an online learning community, based in social learning theory, the TPACK framework, and the CoP framework has the potential to address this multi-faceted problem of practice.

CHAPTER 3

METHOD

In the previous chapters, I provided an overview of the context and problem, discussion of the purposes of the study, a review of related research theoretical frameworks, and the identification of an online community of practice (OCoP) as a potential solution to the problem. Teacher educators (TEs) faced barriers related to professional learning and support for technology integration. This is especially relevant for faculty associates (FAs) who held part-time status within the college. I focus on the methodology of this action research project in this chapter.

Setting

This study was conducted during the fall 2020 semester in Mary Lou Fulton Teachers College (MLFTC) at Arizona State University (ASU). MLFTC has served students through its many programs, the majority of which resulted in teacher certification. Teacher education program courses have been offered at four different campuses. Partner PK-12 school sites also hosted students and faculty in locations across the state of Arizona. The college has regularly employed full- and part-time instructors. Additionally, some were tenure-track faculty members; whereas, others were serving in non-tenure track positions. Finally, turnover is not excessive; however, new faculty do join the college each semester, which includes a frequently changing roster of FAs. Averaging collective data from fall 2018 through spring 2020 revealed 25.59% of the teacher preparation courses were staffed by FAs (J. Hanley, personal communication, February 27, 2020). During fall 2020 37.82% of teacher preparation program courses were assigned to FAs, an increase from the previous semesters' average (J. Hanley, personal communication, January 6, 2021).

Participants

Participants included faculty associates (FAs) teaching for the college. The entire population of FAs were invited to participate in the online community of practice (OCoP). I acquired the names of all FAs (returning and new) from the manager of scheduling operations in the college who managed the hiring of part-time faculty members. At the beginning of the fall semester, all new FAs attended one of three virtual orientation sessions. I co-presented one of the sessions and introduced the FAs to the OCoP and provided training for navigation and use. This also provided me with the opportunity to discuss my research and recruit participants. That session was held on August, 12, 2020. Members of the newly-formed college topical action group focused on professional development and faculty support presented the other two FA orientations sessions on August 14 and 15, 2020. I created videos of my training and recruitment request (1:12 minutes) for FAs to view during the orientation. I included the recruitment letter and consent form in the OCoP and asked the FAs to complete the consent form if they wished to participate in the study. Those who accepted the invitation but did not wish to participate still remained in the OCoP for the duration of the semester; however, their data were not used as part of the research study. For those who were not able to attend the orientation, I shared the video recordings and documentation with them through email announcements and reminders. They were able to respond to the recruitment letter in the same way as those who attended one of the three virtual orientation sessions. All recordings of the trainings for the OCoP and Canvas and the recruitment video were available in the OCoP after the orientation sessions.

I used purposive sampling to identify the research participants from the total OCoP population. This strategy aligns with Teddlie and Yu's (2007) approach where they explained this process calls for the researcher to choose specific cases based on

purpose rather than using random selection. I chose participants based on a set of criteria related to the purpose of the study, which has been a tenet of purposive sampling (Ivankova, 2015). These criteria required participants to be (a) of part-time status within the college, and (b) teaching a course or courses in the major maps of any of the programs that lead to teacher certification. A total of 111 participants met the criteria for the study for the study.

Role of the Researcher

My role was participant as observer. This role allowed me to observe and gather data while interacting with the participants in the OCoP. This active role provided me with insights into the setting (Mertler, 2017). I created and maintained the online learning community and facilitated its use. I embedded an online module I had already created to support instructors' knowledge about technology integration and technological pedagogical content knowledge framework (TPACK). I also requested that instructors share their artifacts and resources related to technology integration by posing questions and seeding a shared area with technological pedagogy practices. I facilitated the learning, communication, and knowledge exchange in the digital spaces. Acting as an action researcher (Mertler, 2017), I collected data for the study. I observed and recorded the use of the intervention. After instructors participated in the intervention for one semester, I collected post-intervention survey data. Then, one week later, I distributed the retrospective, pre-intervention survey to gather data. More information on the use of this procedure has been provided later in the chapter. Further, I kept notes in a field journal throughout the study. I also reviewed course shells and lesson plans of selected participants accessible in the LMS. That review included my interpretive lesson notes and the use of a protocol, described later. I exported descriptive analytics of the

participants' use of the OCoP digital spaces in Canvas and Slack at the end of the study. Finally, I interviewed participants after their participation in the intervention.

Regarding positionality, I was an insider, which was aligned with this method of action research and other methods of practitioner research (Herr & Anderson, 2015). This approach was akin to self-study as I developed and conducted the study while acting as a participant contributing to the innovation and related practices.

Intervention

The multicomponent intervention included various multimodal supports for FAs. Opportunities included asynchronous and synchronous learning modules or sessions, networking methods, teaching strategy resources, example lessons, pedagogical materials, and asynchronous and synchronous collaborative knowledge exchanges. The elements of the intervention were derived from an online community of practice situated within two digital platforms. The first was Canvas, which served as the learning management system used by Arizona State University, fully adopted in the summer of 2019. The second was Slack, which provided an online messaging platform adopted university-wide by Arizona State University in the fall of 2019. Participants had access to an already-developed learning module introducing them to TPACK and foundational theories related to technology integration in education within Canvas. This module was one example of how theoretical frameworks informed the content of the intervention. TPACK (Mishra and Koehler, 2006) was relevant and essential in the resources and learning sessions which were part of the OCoP. Regarding the structure and facilitation of the intervention, research on communities of practice (Wenger, 1998; Wenger, et al., 2009) and self-efficacy (Bandura, 1977) influenced the structure of the OCoP as well as my approaches to moderation and contributing content.

FAs had access to channels in Slack that included pedagogical strategies leveraging technology, also informed by TPACK. For example, they learned how to use digital tools within Canvas, the university-wide learning management system, to assess students and provide effective feedback to them. In another example, participants were provided with resources for engaging students using digital tools. Additionally, resources explaining and showing how to promote student collaboration using digital applications were part of the OCoP. Another component of the intervention was two synchronous professional learning sessions. The sessions were available for later viewing by instructors who could not attend the sessions live. Finally, the OCoP component served as a place where FAs could connect with one another and other instructors to ask questions, share ideas, and learn from each other. The Slack platform allowed them to send messages to individuals or groups at all times, share resource links and files, search all messages, and provide collaborative support. Participants were able to share content in public channels or through private messages and revisit those exchanges and information. Slack acted as the primary communication tool, and Canvas housed the bulk of the instructional resources and content. By leveraging both digital platforms, participants had access to networking, support, resources, and professional learning. Links between the platforms made access between them seamless.

As part of the intervention, I added content to both platforms to support the FAs. The content included the learning module on educational technology integration foundations in Canvas. Additionally, I seeded the OCoP with questions, links, and suggestions. I did this to encourage participation and to build connections. Moreover, if participants had similar needs, questions, or interests, I connected them through the messaging and tagging features in Slack. For example, if an FA wanted to discover digital tools students could use to create projects to display their knowledge

about a course outcome, and I was aware of an instructor who did this well, I tagged that person in the conversation. Thus, Slack allowed me to facilitate connections. Slack also provided ways for participants to share their ideas or teaching strategies with others, which some participants did.

Content also included topics related to integrating accessible technological tools into pedagogy. For example, I focused on engaging students, providing feedback to students, and assessing students, all by using digital tools provided by the college or available at no cost to instructors and students. I provided training during scheduled professional learning sessions, which I conducted using Zoom. Specifically, one training included Pear Deck, which is an interactive presentation application. Instructors were able to use it to engage and assess students. I shared details and training on Jamboard in that session as well. The tool was part of the Google Suite available to all instructors through their ASU credentials and was another engagement tool. I completed another synchronous training through Zoom showing instructors a few strategies for structuring class time, using Zoom breakout rooms, conducting peer review sessions, and giving students authentic feedback. I also included trainings related to using the Canvas LMS and its pedagogical-supportive features. For example, I used an asynchronous training to show instructors how to structure video discussions within Canvas. Participants learned how to engage students, provide feedback, and assess knowledge through this digital teaching strategy.

Instruments and Data Sources

I used a mixed methods approach to gather quantitative and qualitative data. By gathering, analyzing, and integrating both quantitative and qualitative data, I was able to capitalize on the strengths of both types of data while reducing the weaknesses that may exist within both (Ivankova, 2015; Johnson & Onuwuegbuzie,

2004). This approach allowed me to merge data and consider explanations using both types, which acknowledged a researcher's need to refer to a variety of paradigms and consider various perspectives to appropriately investigate a phenomenon (Gelo, et al., 2008). Additionally, a mixed methods approach assisted me to explore my research questions, which aligned with collecting quantitative and qualitative data. I employed a concurrent mixed methods design, which called for the collection of quantitative and qualitative data at the same time, analysis of the quantitative data, analysis of the qualitative data, and an integration of the two types of data (Creswell & Creswell, 2018; Ivankova, 2015). In Table 3, I provided the alignment of the data sources to the research questions. For example, for RQ1, data from the post-intervention survey, OCoP analytics data, and interview data were used to find answers to this research question. I interpreted the other RQs and data sources in the same way.

Table 3

Alignment of Data Sources to Research Questions

Research questions	Post-intervention survey	Retrospective pre-intervention survey	OCoP analytics and contributions	Interviews	Instructors' lessons, materials
RQ1: FAs' OCoP participation	X		X	X	
RQ2: FAs' perceived benefits from OCoP to technology integration	X			X	

Table 3 Continued

Alignment of Data Sources to Research Questions

Research questions	Post-intervention survey	Retrospective pre-intervention survey	OCoP analytics and contributions	Interviews	Instructors' lessons, materials
RQ3: OCoP effect on FAs' technology knowledge and skills	X	X	X	X	X
RQ4: OCoP effect on FAs' technology use and self-efficacy	X	X	X	X	X

Quantitative Data

The instruments and data sources supported the mixed methods design. For quantitative data, I developed and used two instruments to assess three constructs: (a) TPACK, (b) TETCs, and (c) self-efficacy. Informing the development of those instruments were previous TPACK instruments (Abbitt, 2011; Doering, et al, 2009; Schmidt et al., 2009), the Teacher Educator Technology Competencies (Foulger et al., 2017), and previous self-efficacy instruments (Karam et al., 2018; Scherer et al., 2017; Wang et al., 2004). Both instruments used a 6-point Likert scale including responses of *Strongly Agree* = 6, *Agree* = 5, *Slightly Agree* = 4, *Slightly Disagree* = 3, *Disagree* = 2, and *Strongly Disagree* = 1. An example item representing the TPACK construct was "Following my participation in the online community of practice, when planning instruction, I consider integrating technology." An example item from the TETC construct was "Following my participation in the online community of

practice, when teaching, I model approaches for aligning the content being taught with appropriate pedagogy and technology." An example self-efficacy construct item was "Following my participation in the online community of practice, I can teach with technology tools." The instrument also included four open-ended items. One example was "What did you contribute to the online community of practice?" The complete post-intervention survey instrument has been provided in Appendix A.

The same items were included in the retrospective, pre-intervention survey. The purpose for using this method was to address the potential threats to validity of response-shift bias and socially desirable responses related to the experimenter effect (Lam & Bengo, 2003; Smith & Glass, 1987). According to Hill and Betz (2005), retrospective pre-tests were effective when implemented in research in which the goal is to examine the change "experienced subjectively by intervention participants" (p. 514). This method has been useful for participants to evaluate how an intervention has affected their growth and perception of their acquisition of skills (Lam & Bengo, 2003). Further, Lam and Bengo have identified, through numerous studies, that retrospective self-reporting was a more-preferred approach for measuring participants' changes than the traditional pretest-posttest method. Thus, participants had instructions asking them to respond to how they perceived themselves prior to their participation in the OCoP. For example, the parallel item to the one shown above for the TPACK construct was "Prior to participating in the online community of practice, when planning instruction, I considered integrating technology." Items for the other two constructs were constructed in the same way—using the same initial clause, "Prior to participating in the online community of practice, . . ." For example, a TETC item was "Prior to participating in the online community of practice, when teaching, I modeled approaches for aligning the content being taught with appropriate pedagogy and technology." An example self-

efficacy item was "Prior to participating in the online community of practice, I could teach with technology tools." The complete set of items for the retrospective pre-intervention survey is provided in Appendix B.

I also extracted analytical data from the OCoP from both of the digital platforms: Slack and Canvas. This aided in tracking and describing FAs' use of and contributions to both platforms. These data included the number of active days in the OCoP, messages posted, and channel-specific activity. The details showed instructors' total messages sent and files uploaded in Slack. The Slack analytics included numerical data for private and public contributions. I could not view the content of private exchanges, but I was able to gather data showing the number of messages participants sent. The analytics included anonymous individual and group data. These data provided a quantitative picture of the participation levels of the FAs.

Qualitative Data

Four sources of qualitative data informed the study. One source was participant interviews. I interviewed eight participants after they experienced the intervention, using a semi-structured interview protocol, which has been provided in Appendix C. My objective for using this protocol was to understand better participants' perspectives and examine their perceptions of their experiences (Maxwell, 2013). Additionally, this provided another source of data, which has been a strategy of mixed methods studies that allowed for triangulation and enhanced credibility of results (Ivankova, 2015). An example interview item was "Which resources in the online community of practice were relevant to your use of technology in your teaching?" Another example was "If you found an element of the online community of practice useful, what was it?" and "Why was it useful?" Each interview session was 20-25 minutes long, and I conducted one round of interviews

in the last week of the semester and the two weeks following the completion of the semester.

The post-intervention survey also included four open-ended items, which provided another source of qualitative data and information about participants' experiences with the OCoP. As mentioned previously, this instrument has been provided in Appendix A.

The final source of qualitative data was instructors' course lessons and my observational notes for each. The lessons included presentation materials, assignments, and supplemental teaching resources located in instructors' Canvas course shells in the learning management system. These data were gathered from four FAs who were teaching different courses. Evaluations included analyses related to technology integration of five lessons from each of the four instructors during three-week blocks comprising the semester. For example, the first lesson analysis included lessons from weeks one to three in the semester. The second lesson was from the second block of three weeks, which was weeks four through six of the semester. The process continued in this way for the other three-week blocks. The protocol for the analyses of these lessons was derived from TPACK instrument items (Schmidt et al., 2009), ISTE Standards (ISTE, 2017), Triple E lesson analyses rubrics (Kolb, 2017), and instructors' skills. Criteria in the protocol aimed to describe instructors' pedagogical technology use, technology skills, and self-efficacy. For example, a pedagogical technology use criteria statement was "Instructor plans the use of at least one technology during instruction." A technology skill criteria example was "Instructor integrates technology tools in content development in the LMS." Finally, a criteria statement related to self-efficacy was "Modeling of technology for learning is evident in the lesson content." The protocol included constructs from each

of these three areas and included observational interpretive notes for each lesson. The complete protocol has been made available in Appendix D.

Procedure

I introduced all FAs to the OCoP during fall orientation sessions. All FAs have been encouraged to attend one of the sessions offered prior to the beginning of each semester. A recording was also shared with FAs who could not attend a live session. The faculty development and support team delivered three remote orientations using Zoom, which has been used as a videoconference application by ASU faculty and staff members and students: August 12, 2020; August 14, 2020; and August 15, 2020. I co-presented with a faculty member of the support team on August 12, 2020. For the sessions I did not attend, I recorded training videos about the OCoP and Canvas for the other faculty members to play during the other two orientation sessions. In addition, I made videos as resources for all participants. They included a short overview (4:08 minutes) of the OCoP in Canvas and Slack, a longer overview of the OCoP (11:52 minutes), and a Canvas training overview (35:31 minutes). After the synchronous orientation sessions, the faculty support group shared all resources with the FAs, including my recorded training videos. Therefore, all FAs, even those who were unable to attend an orientation, had recordings of all information so they could learn about the OCoP. I added all FAs to the Canvas and Slack OCoP digital spaces by August 17, 2020, the Monday after the orientation sessions. During my portion of the orientation session, and in the recorded videos, I explained the purpose of the OCoP. I followed up after the sessions to ensure all FAs were included in the OCoP and were able to access both digital spaces. In addition to the training, I provided for the FAs during orientation and in the videos, I also shared resources for them for follow-up learning. I responded to questions during the orientation sessions

by doing so live in the session in which I co-presented and through follow-up answers for questions curated during the sessions I did not attend.

The week before classes began, which coincided with the week of the orientation sessions, I sent one announcement to all FAs through the Canvas shell to remind them of the resources in the OCoP. I also posted announcements in Slack. The information I shared in both Canvas and Slack included the videos introducing FAs to the OCoP, written instructions for using the OCoP, questions that FAs had during the orientation sessions, a Canvas training video, information about college resources, and details related to future sessions related to teaching with technology. I posed a question about teaching with technology in Slack during the week classes began, which was the week of August 17, 2020. I also shared an introduction video using Flipgrid in Slack and asked FAs to introduce themselves using the tool. As the semester proceeded, I shared technological pedagogy strategies, ideas, and resources in the OCoP—leveraging both digital platforms to reach the community members. For example, on August 17, 2020, I shared strategies for taking attendance in Zoom. I strategically addressed perceived needs of FAs, which I identified based on their questions, my own teaching experiences, or what full-time instructors were asking about. For example, I was helping mathematics faculty members discover methods for engaging students using Zoom. During a meeting, I shared Google Slides templates with them that focused on replicating face-to-face learning in virtual environments. I determined all instructors and FAs might find the templates useful, so I shared the templates and information in the OCoP on August 30, 2020. On September 25, 2020, I suggested FAs learn more about digital pedagogy and shared the link to the technology integration foundations learning module for teacher educators that I had previously created. I held two short PD sessions from within the OCoP using Zoom. I presented the first on September 28,

2020 and the second on October 15, 2020. I recorded both and shared the recordings in Canvas and Slack for FAs to access at their convenience.

As the semester continued, I added more resources that included specific digital tools linked to instructional goals. For example, I added a video overview of how instructors may use Pear Deck, an interactive presentation application, to engage students during class sessions or between class sessions. I also shared my teaching strategies leveraging breakout room functions in Zoom for peer review and collaborative group work. Another example of content I provided was showing FAs how to facilitate discussions within Canvas that encourage authentic contributions by using the video-recording capability of the LMS. Additionally, I responded to FAs' requests and comments on contributions. I acted as a facilitator who kept the communication channels open and resource-sharing consistent throughout the semester. I recorded notes in my researcher's journal to document my actions and procedures. This was a method to prompt me to follow my proposed timeline in the study and record plans and revelations. All the while, I monitored the analytics of the OCoP and changed procedures based upon use levels. For example, in Slack, I realized most FAs were participating in a channel that was shared with full-time faculty in the college. I monitored that channel carefully and contributed much of my strategy-sharing there since it was most active. I also knew not all FAs were using Slack. For that reason, I constantly shared the same information in both Canvas and Slack. I linked the resources in both places as well. I wanted to engage as many FAs as possible and tried to do that through Canvas announcements, which would arrive in their email, and in Slack channels which some were consistently viewing. I adjusted the structure of my contributions and use of the OCoP to suit FAs' use. I continued to post information, announcements, teaching ideas, and other strategies throughout the semester. I also asked questions to entice FAs to contribute. For

example, on November 10, in Slack, I posted a gif that read "Why don't we combine all of our ideas?" and included the message "We welcome your teaching ideas . . . questions regarding a particular objective, pedagogy, or instructional topic."

During the final, full week of November, I distributed the post-intervention survey. I requested participation with announcements in both Slack and Canvas on November 23, 2020, and I sent three follow-up reminders that week. One week later, on November 30, I distributed the retrospective pre-intervention survey. I asked for participation by using announcements in Slack and Canvas and followed up with three reminders that week. During the first two weeks of December, I interviewed eight participants. I analyzed instructors' course shells and corresponding lessons and materials at different periods between November 23, 2020 and December 5, 2020. The timeline and details about the procedures have been provided for review in Table 4. Also, I posted in Slack and added announcements to resources in Canvas frequently, sometimes multiple times each day. The timeline provides a snapshot of my contributions in the OCoP through highlights.

Table 4

Timeline and Procedure for the Study

Time frame	Actions	Procedures
August 12, 14, 15, 2020	Introduced OCoP to FAs Shared resources in OCoP	• Added all FAs and mentors to OCoP • Trained FAs to use Slack and Canvas
August 30, 2020	Shared resources in OCoP	• Announced available college training sessions
September 2, 2020	Shared resources in OCoP	• Posted strategies for getting technology integration support
September 25, 2020	Shared resources in OCoP Shared technology integration foundations learning module	• Added strategies for engaging students with technology • Advertised PD session
September 28, 2020	Shared PD session reminder	• Delivered synchronous PD session on Pear Deck and Jamboard
September 29, 2020	Shared recorded PD session in OCoP	• Reminded FAs to view the PD session to learn about engaging students
October 8, 2020	Shared links and resources in OCoP	• Reminded FAs about OCoP content, IgnitED Labs help
October 12, 2020	Shared upcoming synchronous PD session information	• Reminded FAs about PD session

Table 4 Continued

Timeline and Procedure for the Study

Time Frame	Actions	Procedures
October 15, 2020	Presented synchronous PD session on peer review Posted recorded PD session and resources	• Delivered session through Zoom • Shared recording in OCoP
October 27, 2020	Shared resources in OCoP Shared information about IgnitED Lab content	• Added resources about active learning with technology
November 1, 2020	Shared resources in OCoP Asked questions in OCoP	• Shared ASU digital pedagogy links
November 10, 2020	Shared resources in OCoP Asked questions in OCoP	• Added resources about digital communication
November 23, 2020	Collect post-intervention data	• Administer post-intervention survey
Nov. 23-Dec. 5, 2020	Analyze FA lessons	• Apply lesson protocol and take notes
November 30, 2020	Collect retrospective pre-intervention data	• Administer retrospective pre-intervention survey
December 2–16, 2020	Interview participants	• Conduct interviews
December 5, 2020	Obtain OCoP data	• Export analytics from Slack and Canvas

CHAPTER 4

DATA ANALYSIS AND RESULTS

The previous three chapters included a description of the problem in context, details of the study's purposes, overviews of the theoretical frameworks informing the study, information about an online community of practice (OCoP) and its possibility as a solution to the problem, and the methodology of the project. Analysis and results from the application of the methodology presented in the previous chapter comprise the content of this chapter. Data from quantitative and qualitative measures are included. Each research question corresponded with at least one quantitative data source and one qualitative data source.

RQ 1: How and to what extent do part-time faculty members participate in an online community of practice for the purpose of collaborating about technology integration?

RQ 2: What are part-time instructors' perceptions of their participation within an online community of practice as related to their integration of technology?

RQ 3: How and to what extent does the implementation of an online community of practice for part-time teacher preparation instructors who are infusing technology into their courses affect their technology (a) knowledge and (b) skills?

RQ 4: How and to what extent does the implementation of an online community of practice for part-time teacher preparation instructors who are infusing technology into their courses affect their (a) technology use and (b) self-efficacy?

In the first section, I report on all data analysis procedures. Subsequently, I report the quantitative data and results in a second section. Qualitative data and results are the focus of the third section. The third section includes key assertions

developed from themes and presented with support from theme-related concepts and quotes from participants.

Quantitative and Qualitative Data Sources

Quantitative data were derived from four sources. The first two sources were paired instruments, which measured three constructs related to FAs' experiences with the OCoP. The first was a post-intervention survey, and the second was a retrospective, pre-intervention survey. From those instruments, data included corresponding post-intervention scores and retrospective, pre-intervention scores for 12 participants who responded to both surveys, which were used to conduct a repeated measures analysis of variance. The third source for quantitative data was analytics from the Canvas LMS. Analytics included reports on participants' activity in the Canvas organizational shell. Descriptive statistics are presented to illustrate activity. Canvas analytics also produced a report detailing the specific resources accessed by participants. The final source of quantitative data was Slack analytics. Data describing participants' behaviors in the Slack messaging system, which was the second component of the OCoP, have been presented in tables later in the chapter.

Qualitative data came from three sources. Sources included interviews of FAs, open-ended survey responses from FAs on the post-intervention instrument, and lesson analyses with interpretive observational notes. Interview transcripts, open-ended responses, and interpretive observational notes from the lesson analyses were analyzed in HyperResearch coding software using the constant comparative method (Strauss & Corbin, 1998). This process began with initial coding using structural and process coding (Saldaña, 2016), moved to category creation, grouping of categories into themes, and development of assertions from the themes and theme-related components. Lesson analyses data came from the protocol and resulted in three

scores for each lesson. Assertions about instructors' scores were developed through analysis of protocol constructs and interpretive lesson analyses notes.

Data Analysis Procedures

I analyzed both quantitative and qualitative data after the collection of all forms of data. I transferred data from the quantitative instruments to SPSS (IBM SPSS Statistics, Version 25.0) and analyzed the quantitative survey data. Twelve participants provided data for both the post-intervention survey and the retrospective pre-intervention survey, so I was able to conduct a repeated measures analysis of variance (ANOVA). I transferred quantitative data from the Canvas analytic use reports to examine FAs' uses of the Canvas space. I transferred that data to SPSS to compute then analyze the descriptive statistics. I made other observations and inferences based on the other analytic data I had from Slack and Canvas to help describe participants' uses of those spaces. The analysis of the interview transcript qualitative data and the open-ended responses from participants' post-intervention data began with reading and rereading them and then moving on to initial coding and then progressing to developing categories, themes, and assertions using 'grounded interpretation' (R. Buss, personal communication, Jan. 15, 2020; see also Charmaz, 2014; Saldaña, 2016). This process was based on the constant comparative method (Glaser & Strauss, 1967), which I used to compare codes within data and between data. Further, I used it as I developed categories and themes. Throughout the qualitative analysis procedure, as I coded, I recorded the process using analytic memo-writing and developed codes, categories, and themes through that process (Saldaña, 2016). I used HyperRESEARCH during coding to record and track codes, categories, and so on. I developed assertions from the themes and used direct participant quotes to support the assertions and themes. Further, I developed an instructor lesson analysis protocol, which included

interpretive observational notes. I repeated the coding strategies previously described to develop codes, categories, and themes to analyze the twenty lessons using these interpretive methods. The protocol also included themes of pedagogical technology use, technology skills, and self-efficacy, and I used those to evaluate and describe the lessons.

I merged the quantitative and qualitative results to triangulate the data (Creswell & Creswell, 2018; Ivankova, 2015; Mertler, 2017) and examined the complementarity of the data (Greene, 2007). This allowed me to make sense of the findings and consider the validity of my assertions, which I arrived at, in part, through the use of the theoretical frameworks. The TPACK model (Mishra & Koehler, 2006) has been successful in previous studies in showing how instructors have learned about and better understood the process of integrating technology into their teaching. I anticipated that using the framework and including it in the OCoP should have an effect on the participants' perceptions about technology integration. I reviewed both the quantitative and qualitative data to determine the effect, if any. In particular, the instruments included a construct about TPACK, and the interview also had a question about the framework. The protocol for lesson analysis also capitalized on TPACK. I interpreted the results by considering the previous research findings in the literature. I anticipated finding the data would support the previous information about the effectiveness of the TPACK framework.

Using the research regarding CoPs (Wenger, 1998; Wenger, et al., 2009) and OCoPs (Macià & García, 2016) and the data I collected from the participants, I was able to describe and understand the levels of participation and how participants approached their roles in the online community of practice. This framework was applied to all of the data I collected. Regarding quantitative analytics data, I used the information about OCoP patterns of participation from the literature to aid in

analyzing the analytics data from Slack and Canvas. I arrived at conclusions based on the data and the trends about information-sharing, use, and networking from literature about OCoPs. This information also assisted in analyzing the open-ended items on the post-intervention instrument. Subsequently, questions in the qualitative interview protocol focused on OCoP participation, and the framework aided in guiding the conclusions drawn from those data.

Finally, the research on self-efficacy (Bandura, 1977) assisted in the analysis and interpretation of the data. Questions on both quantitative instruments and in the interview protocol concerned participants' self-efficacy as related to technology integration. By analyzing FAs' lessons from across the semester, their use of technology led to conclusions related to developing self-efficacy. Previous research has shown that participants in OCoPs have experienced improvements in self-efficacy. Considering the self-efficacy framework aided in the development of assertions about the results of participation in an OCoP as related to an instructors' perceptions about ability to integrate technology into instruction.

Quantitative Data Results

Various sources of quantitative data provided results related to all research questions. The post-intervention survey addressed RQ1, RQ2, RQ3, and RQ4. The paired data set from the post-intervention survey and retrospective, pre-intervention survey addressed RQ3 and RQ4. Analytics from Canvas and Slack addressed RQ1, RQ3, and RQ4.

Post-intervention Survey

Participants provided open-ended responses reporting the time they spent in the OCoP during the semester. Twenty respondents answered the question about their time using the OCoP. One responded with "unsure," and two answered with "0." Data for the other respondents have been provided in Table 5.

Table 5

Descriptive Statistics of Participants' Reported Total Time Spent in OCoP (n = 17)

	Minutes Reported
Mean	277.35
Median	30.00
Mode	20.00
Std. Deviation	572.86
Range	2395.00

Post-intervention and Retrospective, Pre-intervention Surveys

Using SPSS, I computed Cronbach's alpha reliabilities prior to conducting a repeated measures analysis of variance (ANOVA). The retrospective, pre-intervention assessment reliabilities for the three dependent variables on the survey were, .96, .91, and .92, respectively for the TPACK, TETC, and Self-Efficacy variables. These reliabilities were all well above .70, which has been used as a criterion for acceptable levels of reliability. Thus, these data were highly reliable.

I conducted a repeated measures ANOVA using SPSS to determine whether differences existed between the retrospective, pre- and the post-intervention scores. The overall repeated measures ANOVA was significant, multivariate-$F(3, 9) = 14.41$, $p < .001$, with $\eta^2 = .828$, which was a very large within-subject's effect size based on Cohen's criteria (Olejnik & Algina, 2000). Thus, individual follow-up ANOVA analyses were conducted for each of the three dependent variables. The repeated measures ANOVA for TPACK was significant, $F(1, 11) = 23.03$, $p < .001$, with $\eta^2 = .677$, which was a very large within-subject's effect size based on Cohen's criteria

(Olejnik & Algina, 2000). Thus, there were substantial differences in the retrospective, pre- and post-intervention means for the TPACK variable. This fact was evident in Table 6 in which means and standard deviations for three dependent variables have been presented. See Table 6. Similarly, the repeated measures analysis for TETCs was significant, $F(1, 16) = 10.01$, $p < .009$ with $\eta^2 = .476$, which was a very large within-subject's effect size for a within-subjects design. Finally, the repeated measures analysis for Self-Efficacy was significant, $F(1, 11) = 15.24$, $p < .002$ with $\eta^2 = .581$, which was a very large within-subject's effect size based on Cohen's criteria (Olejnik & Algina, 2000). Taken together, there were quite substantial changes in the dependent variables with scores changing 0.76, 1.03, and 0.73 points, respectively for the TPACK, TETC, and Self-Efficacy variables, as seen in Table 6.

Table 6

Means and Standard Deviations for Pre- and Post-Intervention Scores for the Three Dependent Variables from the Survey (n = 12)*

Variable	Pre-Intervention Scores	Post-Intervention Scores
TPACK	4.73 (0.86)	5.49 (0.43)
TETC	3.75 (1.31)	4.78 (1.20)
Self-Efficacy	4.60 (0.99)	5.33 (0.46)

*—*Note*. Standard deviations have been presented in parentheses.

Summary of Survey Data. Taken together, the survey data indicated participants' TPACK, knowledge of technology (TETC), and Self-Efficacy scores all increased significantly for these 12 participants. Gains were substantial as indicated in the effect size measurements and in the actual scores themselves, which

increased by between 0.73 and 1.03 points for the three constructs. Thus, participation in the project fostered substantial gains as evidenced in these results.

Canvas LMS Analytics

Two relevant reports from Canvas analytics provided data. The first report displayed the number of page views for participants during the semester. Canvas also tracked timed activity for participants in the People section of the LMS. I combined that data with the corresponding page view data to produce a data set to describe participants' use and activity. I removed data from participants who were not FAs but were in Canvas to function as mentors. Some FAs had not accepted the course invitation to the Canvas space, so they were not included as participants. Of the remaining 111 participants, 57 were active in the Canvas component of the OCoP. Identifying them as active indicated they logged over one minute of time in the Canvas MLFTC Teaching Community organizational shell and had multiple page views of content within the space. Of those participants, data depicted an unreasonable total amount of time of activity with respect to the number of page views tracked for 14 of them. For example, one participant was active in the course for 317 minutes but only logged 43 page views. Another participant was active for 22 minutes and logged nine page views. Due to the likelihood that these participants had logged in to the Canvas course, engaged, and then remained logged in after their period of engagement, erroneously tracking time logged in, but in which they were not engaged, I decided to remove their data deeming it invalid because I determined the system was likely tracking their active time although they were not actively viewing or reading sources in Canvas. After removing data associated with the 14 participants, I then calculated descriptive statistics for the remaining 43 participants, which have been provided in Table 7.

Table 7

Descriptive Statistics for Participants' Canvas Activity (n = 43)

	Page Views	Minutes
Mean	37.14	66.52
Median	15.00	15.40
Mode	2	10
Std. Deviation	63.845	193.975
Range	360	1236

Using data from associated with the 43 participants, I developed levels of use classifications to describe activity. With a range of 1 minute to 1236 minutes, I viewed the length of time spent in Canvas and determined three levels depicted the time and activity. FAs (*n* = 21) who spent 1-10 minutes in Canvas were minimally active. Participants (*n* = 8) working in Canvas from 11 minutes to 30 minutes were moderately active. Finally, highly active participants (*n* = 15) were using Canvas between 31 minutes and 1236 minutes.

Another report from Canvas provided data about participants' access of each resource or asset in the organizational shell. The total number on the report was 79, which provided access data for all items in the shell, including images and decorative content. I did not analyze the data related to images and decorative items because it did not reveal relevant information about participants' behaviors and use. I did focus, however, on announcements (21), navigation links (10), and all content pages (25). An announcement usually directed participants to review a strategy or element of the OCoP or reminded them about a synchronous learning session. For example, an announcement entitled "Happy Thursday! Let's Learn a Little!" was a reminder about the professional learning session that was occurring that afternoon. Navigation links

took participants to locations within the shell or outside of the shell. For example, FAs could click on "ASU Canvas Training and Support" to view the university-provided LMS website that offered training and resources. Content pages focused on specific instructional strategies with a majority focusing on technology integration. Some pages were gateway pages to lists of resources. For example, "Technology Integration Tools and Strategies" had a wealth of information on the page and also included links to specific technology-related teaching resources, such as "Enhanced Pedagogy with Canvas" and "Active Learning with Tech." To condense the data and provide a description of the content with which participants engaged, I created a table to display relevant resources. These data have been presented in Table 8.

Table 8

Canvas Resources and Content Accessed by Participants

Resource	Participants	Page Views
Course Home	99	413
Course Modules	47	97
Teacher Prep Resource Center	28	56
ASU Canvas Training and Support	22	44
Slack: MLFTC TLN	12	18
Technology Integration Tools and Strategies	10	48
Technology Integration Foundations for Teacher Educators	7	10
Active Learning with Technology	12	19
Instructional Strategies and Related Resources	6	12
Active Learning	2	2

There were a few highlights in Table 8 warranting brief consideration. For example, a majority of participants viewed "Course Home," which was the home page of the Canvas community. This indicates most FAs visited the space. Some of these participants (n = 28) used this resource to access outside resources. The

"Teacher Prep Resource Center" was a link in Canvas that led FAs to an external website outlining instructional specifics for faculty new to MLFTC. Also revealing were the data showing 10 FAs accessed the "Technology Integration Tools and Strategies" page 48 different times. FAs using the content on this page returned so may have found it valuable.

Slack Application Analytics

Exported analytics from Slack provided data about members' behaviors and participation in the messaging application workspace associated with the OCoP. Slack data is all anonymized, so I could not remove my data nor the data from the full-time faculty functioning in the space as mentors for FAs (n = 10). Unlike Canvas, FAs did not need to accept an invitation but were automatically placed in the digital space. Therefore, a total number of 153 participants appeared in the data. Clearly some data evident in the Slack reports could be contributed by community members who were not FAs, which is important to note when considering results. The network overview report produced daily data points depicting the actions of members for each day and included the number of active members, the total number of messages posted, the total number of messages posted in shared channels, and the total number of messages sent in private direct messages, among other information. To condense the data, I used a strategy to create a table to provide a weekly snapshot of the behavior of participants in Slack. The data, provided in Table 9, showed the relevant statistics from each Friday beginning with the Friday before the orientation sessions that introduced FAs to the OCoP (August 7, 2020) through the last Friday of the fall semester, December 4, 2020.

Table 9

Participants' Activity within Slack

Date (Weekly)	Weekly active members	Members posting messages	Messages in public channels	Messages in shared channels	Messages in DMs
2020-08-07	7/127	4	2	2	0
2020-08-14	25/127	13	5	9	24
2020-08-21	37/137	21	12	32	248
2020-08-28	35/137	16	2	4	71
2020-09-04	28/142	12	0	7	81
2020-09-11	29/141	15	3	11	104
2020-09-18	24/142	11	0	4	47
2020-09-25	18/142	9	1	10	41
2020-10-02	28/141	13	0	0	11
2020-10-09	17/141	10	1	9	98
2020-10-16	15/140	6	1	0	1
2020-10-23	7/145	4	0	2	3
2020-10-30	19/144	5	0	1	113
2020-11-06	23/143	6	0	0	126
2020-11-13	20/143	4	0	4	146
2020-11-20	6/143	4	0	6	12
2020-11-27	25/143	8	0	0	0
2020-12-04	19/143	7	0	3	57

As illustrated in Table 9, some elements indicate how and when FAs were using the Slack portion of the OCoP. The pattern of access included higher levels of use early in the semester following the introduction of the OCoP. Likewise, the beginning of the instructional term, which was August 20, 2020, and the following four weeks included higher levels of use. As the semester progressed, use declined, but there were interesting 'up ticks' in use in November and near the end of the semester. FAs did return to the space during those periods. The highest number of FAs posting messages in Slack was 21; however, a consistent few did contribute

through these means. Messages in DMs were those shared privately among community members. Those numbers were higher early in the semester and again toward the end. FAs were communicating with others through this method.

The other report exported from Slack depicted the engagement with the specific channels of the workspace. The analytics from the system included information about each channel accessible in the workspace, which included shared organizational channels that were not all relevant to this study. To focus on only relevant channels, I removed the channels that were not part of the OCoP workspace in Slack and developed a table to display those data. Those data have been presented in Table 10.

Table 10

Channel Analytics from Slack

Channel Name	Total members	Messages posted	Members who posted	Reactions added	Members who reacted
announcements	153	53	3	11	6
asu_tech_support	151	16	3	2	2
ble	1	0	0	0	0
canvas_help	151	31	6	2	2
community_members	151	4	1	0	0
digital_citizenship_modules	1	1	0	0	0
ecd	2	0	0	0	0
ecs	1	0	0	0	0
edtech	151	31	4	3	1
eed	1	0	0	0	0
mlftc-faculty-support	663	262	54	280	76
online_community_canvas	151	3	1	0	0
random	153	0	0	0	0
sed	1	0	0	0	0
spe	1	0	0	0	0
teaching_ideas	151	16	6	8	4

To provide some context, ble, ecd, ecs, eed, sed, and spe indicated programs offered by the College such as bilingual education, early childhood education, and so on. Community members had the option to opt-in to those channels. Most did not choose that. The other channels were more self-explanatory. There were three channels that were particularly relevant to the study, and I have highlighted them here. For example, the announcements included the most content and activity. Posts included questions, suggestions, links to resources, information about training opportunities, good news, and motivational comments. Taking note of mlftc_faculty_support, the membership number is higher and activity is elevated. This channel was a shared channel across workspaces, which means all faculty members and some staff in MLFTC had access. This was a channel that included activity from FAs as well as full-time faculty members. The channel named edtech had content that supplemented instructional resources in the Canvas space which focused on educational technology. Some FAs did connect those experiences in the Slack space and posted questions and ideas in the edtech channel.

Summary of Analytic Data. Of note is the different number of participants in the Canvas space and Slack space. Canvas data includes names, so I was able to remove data from members of the community who did not meet the criteria. Those removed were full-time faculty functioning as mentors for FAs. Slack data is anonymized, so I could not identify which participants were full-time faculty mentors and which were FAs. Considering that information, then, analytics from Canvas and Slack contribute to the description of how, when, and for how long FAs engaged with the OCoP and its various elements. Access and activity were at elevated levels just after the beginning of the term and near the end of term. FAs spent time in both digital spaces with an average of 66.52 minutes in Canvas during the semester.

Additionally, they used Slack for communicating with others privately more than publicly. Use levels and purposes varied, which is evident in the data reports.

Qualitative Data Results

Qualitative data sources corresponded with the four research questions. Open-ended responses from the post-intervention survey about participants' use and perceived benefits of the OCoP provided results for RQ1 and RQ2. Interviews addressed RQ1, RQ2, RQ3, and RQ4. Lesson analyses of instructors' Canvas lesson, materials, and delivery content provided results for RQ3 and RQ4.

Using the constant comparative method (Strauss & Corbin, 1998), I analyzed the qualitative data that included the interview transcripts and open-ended responses from the post-intervention survey. I combined these two data sources as the first data set because the content was comparable and was in the participants' own words. I applied process coding (Saldaña, 2016) for the first cycle. As I listened to the interviews and read the transcripts, I created codes ending in gerunds to describe the concepts. To transition from cycle one to cycle two, I evaluated a visual representation of the frequency of the codes by using the code landscaping method (Saldaña, 2016). Considering the frequency of codes, I moved to a second cycle using structural coding (Saldaña, 2016) as I wanted to be sure I was capturing the concepts as related to the research questions. I reviewed my research questions and identified concepts and content within, which I then listed to guide my focus topics and content on which to consider. I did not create codes from these concepts. Rather, I reviewed the terms and used some of the terms and concepts as I coded a second cycle. I modified some of my original codes based on the outcome of the structural coding process. I then followed the second cycle by applying pattern coding methods to group codes together (Saldaña, 2016) and develop encompassing categories. I moved then to the codeweaving method (Saldaña, 2016). I wrote about

the categories, which led to my collapsing and combining some. I was still considering how to effectively structure the codes as theme-related components within the larger themes, so I consulted a colleague to "shop talk" (Saldaña, 2016) about the analyses. This conversation led to the final development of my themes. After coding using these strategies, I had developed codes, which I then categorized. From those categories, I created themes. Those themes directly informed my key assertions, which have been provided in Table 11.

Qualitative Data Results from Interviews and Open-ended Survey Responses

Results from all qualitative data sources are available in this section. To begin, themes, their corresponding theme-related components, and key assertions from the combined interview and open-ended response data are visible in Table 11. Following that are discussions of each of the themes and assertions, supported by quotes from the data. All references to participants feature pseudonyms.

Table 11

Themes, Theme-related Components and Assertions*

Themes and Theme-related Components	Assertions
Discussion of instructional technology integration 1. Experiences teaching with technology 2. Functional technology use 3. Instructional decisions 4. Identified limitations of technology	1. Instructors balanced functional and pedagogical technology use as members of the OCoP, which affected their instructional decisions and responses to technology limitations.
Factors affecting technology use and integration 1. Focus on student needs 2. Recognition of personal limits 3. Feelings of support 4. Risk-taking to learn 5. Technology integration knowledge from familiar sources outside of the OCoP	2. When planning pedagogical technology use, instructors relied upon various sources of knowledge as they attended to their personal limits and their students' needs.

Table 11 Continued

Themes, Theme-related Components and Assertions*

Themes and Theme-related Components	Assertions
Development of technology integration 1. Improved skills 2. Gained knowledge 3. Technology problem-solving through collaborations with others	3. Instructors gained technology integration knowledge, improved technology skills, and applied their learning in their teaching experiences.
Online community of practice reflections 1. OCoP engagement levels 2. Reflection on OCoP engagement 3. Intention to revisit OCoP	4. Instructors who engaged in the OCoP found it valuable and benefitted through identified knowledge gains, increases in self-efficacy, and elements of community.

*Note. Themes are in italics.

Discussion of Instructional Technology Integration. *Assertion 1 - Instructors balanced functional and pedagogical technology use as members of the OCoP, which affected their instructional decisions and responses to technology limitations.* The first assertion corresponded to the first theme and derived from the theme-related components related to the interview and open-ended survey response data. Those theme related components were (a) experiences teaching with technology, (b) functional technology use, (c) instructional decisions, and (d) identified limitations of technology.

***Experiences Teaching with Technology*.** All instructors' descriptions of their technology use in teaching included the integration of various technologies during instructional time and focused on their engagement with digital technologies as well as their students' engagement. Teaching with technology meant different things to different instructors. Some were focused on lower-level technology use such as tool selection; whereas, others conceived technology use at higher levels connected with achieving learning goals.

Some FAs focused on identifying specific tools they incorporated into their instruction. For example, Jenn (all participants were provided with pseudonyms) shared different tools her students were frequently engaged with during class meeting times when she stated in her interview,

> . . . they do on a Google Doc, and that's uploaded to their Google Slides. Just different kinds of templates that they, collaboratively, they use technology in every single class. There was some, either Padlet, Google Form . . . Digication.

Fiona also listed a number of digital tools integrated by her for her use or her students' use when she asserted,

> I use Jamboard. I used Google Slides, of course, YouTube videos that I made. I had stuff on explaining everything I made. . . . They used, oh, Canvas, I guess I should have said we used Canvas. So, of course, we used the discussions in Canvas. We used Padlet to discuss. They used Google slide presentations. . . . They, some of them created a Google Classroom. Many of them used Pear Deck for their lessons they created for me. They used Kahoot. They used, oh, I used Mentimeter. Also, they used Google Slides. A lot of slide deck functions. . . . Of course, they used all the Padlets that they dropped in and the Kahoots, and the Quizlets and things that they could find, because they were creating lessons to turn in to me.

Other instructors described their teaching objectives and student outcomes rather than focusing on identifying specific digital tools. For example, Allie talked about having her students collectively share ideas using a digital board when she maintained,

> I did use the one where we would brainstorm . . . where it's like sticky notes, and they go up there. So I would say, you know, 'what is one of your bucket

> lists,' you know, and then they would go and they would fill it in. And they could insert images or text.

Allie went on to discuss some of her course session time structures to explain how students were actively using technology (Zoom) and said,

> We did do breakout groups every class session so that they can kind of touch base with each other to talk about their, their lessons that they taught in the classroom. . . . Then I also gave them a task to create an assessment. So then they would break out and create that. And then when they would come back, they had to share their screen. So then they could present within their group.

Cara, as she discussed how she and her students used technology, focused on learning outcomes and then explained which tools she chose to meet those objectives when she shared,

> So I would try to embed different activities for my students to go to either practice or reinforce what they have learned through our lecture or our presentation. For example, I used Padlet. I used Jamboard. I used a couple of different activities where you can make games. So like Quizlet, a Jeopardy game, Educandy. A couple things. Just like that. That would give them time to reflect or to practice whatever we were working on.

Mentioning purposes for using technology was part of Viv's responses as well. Before discussing specific tools, she said,

> But pretty much when I choose to use it–technology–I try to make it as interactive as possible. And I know that people don't have a lot of attention spans, and I purposely try and change up, like, what we're doing. We don't sit and I don't speak in front of the camera, for I really try to get them interacting and doing the problems and then sharing out their problems . . .

Functional Technology Use. Instructors did not specifically categorize their technology use as pedagogical or functional. Nevertheless, their discussions clearly revealed they used technology to achieve pedagogical objectives and to conduct functional, administrative tasks. Finally, functional technology use incorporated basic tasks such as sharing files, communicating, and obtaining students' assignments.

For some, functional use was more prominent in their responses. Susan, for example, referenced using technology for operational purposes sixteen times. In one such example, she said, "They use Zoom and breakout rooms. I mean, they had to obviously get on to join the meetings." She further explained she and her students used Zoom "for office hours where they would often share screen with their questions, and we could go through together." Rather than explaining the pedagogical integrations of technology, Susan frequently described the technology uses in her class as supporting operational and administrative procedures. About her students' technology use, she said, "I mean, they're all communicating via email, whether it's through Outlook or through Canvas."

Some of Leah's responses focused on spending effort in ensuring students used the correct link to access the class meetings on Zoom. She described the process when she said,

> The link for the same classes. So some students who knows their day just click that. One student that had hard time. I just copy and pasting the invitation for the Zoom courses. So they have in the email and later on what I did, you know, even just keep send me, like, after classes start, you know, 'I don't find the link or where can I find it?' So the method of what I used it. I just put it in the Canvas first thread. Here is the link with text . . . so they can find . . . where . . . they can come to the Zoom.

Instructional Decisions. Some instructors shared thoughts about the course designs they were obliged to follow. By comparison, others described adapting technology use to be more closely conformed to their instructional approaches and students' needs. Additionally, some instructors reflected on their experiences and determined how these efforts would lead to revisions in technology use in future instructional opportunities.

Greg, for example, noted his technology integration was specifically aligned to the course design since it was "pre-packaged . . . . well-designed." Due to the effective components in the course, he indicated his instructional changes were limited.

Three other FAs, however, did share changes they made in their teaching and technology use. Viv gave her students opportunities to share their ideas and changed an assignment based on students' various digital technology uses earlier in the semester. She stated,

> . . . it worked beautifully. You know, so they walked through a whole solving a problem and what they were doing and there was no way they could have ever pulled it off, you know, so those worked out great. And they really liked it, and they got to choose which one, which option.

Allie and Leah noted specific changes they intend to make in future instructional experiences leveraging technology. Allie indicated she will "maximize the learning" during instructional time by better implementing and monitoring Zoom breakout rooms. Leah's plans were similar. She intended to require students have their video cameras on during Zoom sessions and will "put it in my syllabus."

Identified Limitations of Technology. Four of the eight FAs interviewed cited problems with certain technologies and discussed their responses to the limitations they or their students encountered. Limitations affected instructors'

perceptions of certain technologies and willingness to use them. Specific annoyances developed when instructors had prepared to implement technologies and the devices or applications did not provide their preferred or expected functionality. Additionally, students' misuse or limited skills were also constraints.

Jenn cited having issues with a specific tool, Padlet when she said,

> I used Padlet at the beginning. I really liked it but because I use videos a lot because that really enhances class. Yet it's such a challenge because it's so picky about which videos it will let you download. . . . So it is frustrating.

Although Jenn did have trouble using Padlet and showing embedded videos, she continued to use that tool in her instruction. She voiced another limitation related to students' use of it when she stated,

> You can get videos for Padlet, and you know, that will show you, like, how to log in. So, some of them, still to this day. . . . You haven't created an account with their name, so, like, at least put your name on it. You come up anonymous. I don't know who wrote this, so it's like you didn't participate in this part of the class.

Jenn also had frustrations with having an effective webcam to use when she was reading children's literature to her students in Zoom and explained, "I just didn't have the right camera necessarily that would give justice to the illustrations."

Viv's frustrations with Google Slides related to the time it took for students to solve mathematics problems and share them with the whole class. She explained,

> I was doing a lot with, like, Google Slides and trying to make it happen that way as quickly as I could. And I noticed we're only being able to share maybe two to three examples before, like, my hour and 15 minutes are up. You know what I mean? So, like, a report every type of problem we're doing, we'd only be able to show you . . .

Also related to wanting to maximize instructional time, Leah discussed the process of sharing screens in Zoom as problematic when she noted,

> And sharing the Zoom screen is getting, you know, when you start to sharing the, showing the Canvas, you need to stop sharing, go to the, like, a PowerPoint. Stop sharing. Go, like, so you need to just coming in and out. So if I have to share a lot of things, I just put it under Google Drive.

Factors Affecting Technology Use and Integration. *Assertion 2 - When planning pedagogical technology use, instructors relied upon various sources of knowledge as they attended to their personal limits and their students' needs.* This assertion devolved from the theme-related components of (a) focus on student needs, (b) recognition of personal limits, (c) feelings of support, (d) risk-taking to learn, and (e) technology integration knowledge from familiar sources outside of the OCoP.

Focus on Student Needs. Seven of the eight FAs interviewed strategically incorporated technologies or use of those technologies into their instructional methods based upon perceived or known student needs. Instructors considered capabilities of technologies as well as perceived benefits for students when selecting when and how to integrate digital applications. Some FAs understood students as needing opportunities to create community. Others recognized students as benefitting from options and flexibility and modeled ways technologies could provide those benefits.

For example, Greg leveraged Zoom's capabilities to contribute to community-building among students in his course that included first-year students when he said,

> And so in order to achieve some cohesiveness and some feeling of belonging, I had them form groups for discussions and did a lot of breakout sessions and

especially for the components that had to do with peer review and critiquing. I noticed in their reflections that they got a lot out of that.

For Jenn, offering students choices with their own technology use was a way to support them. Her course required students create a digital portfolio that was supposed to be completed in a specific platform called Digication. Jenn allowed her students to create the portfolio in Wakelet or Weebly and said, "I gave students that choice because some already had a Weebly. I said, 'you know, if you don't have a Weebly, maybe you would like to use Wakelet. Let me show you how it works. It's really easy.'"

Being flexible with students as they completed assignments was also important for Cara. She described her approach saying,

> Some of my students, they had to create a toolkit, and I gave them the option. . . . They asked if they could do something in a different format. So I gave them the option to use Google Slides or something pod. I can't think of it right off the top of my head. Nearpod! They video record themselves and it has a slide share that goes with it when students did a Prezi presentation. . . . So I tried to make it more feasible for them to utilize and do by incorporating technology also into one of the assignments.

For other FAs, supporting students included strategies that Jenn and Cara mentioned, and those instructors provided students with more choices by introducing them to different technology tools or by suggesting students use those tools they are already skilled at using. Additionally, some FAs spent more time modeling technologies and showing students how to use tools. Some achieved this through synchronous meetings and others developed asynchronous methods and shared recordings of lectures or assignment explanations with students to provide them extra assistance.

Recognition of Personal Limits. Each FA interviewed and responses from the post-intervention survey included descriptions of avoiding certain technologies and the application of others due to personal reasons or preferences. Although FAs had information and resources in the OCoP about different pedagogical strategies and tools to help them achieve their learning objectives, some determined they would not use those suggestions with their students. Identifying barriers like lack of knowledge or inadequate abilities influenced instructors' implementation plans for technologies. Most depended upon familiar applications and chose those before learning and using additional applications.

As one anonymous participant noted in the post-intervention survey, the OCoP introduced "many different tools that I thought were too difficult to learn."

A number of FAs knew of Slack but did not use it. Susan said, "I did not use Slack, just because I felt overwhelmed to learn one more thing." Greg was aware of Slack as a messaging application he could use with students but said, "I never did really get into using Slack that much. I relied more on the group functions of Zoom." Leah had intended to integrate Slack into her instruction but said, "I set up the Slack, but it was hard to just communicate with two channels actually—Canvas and emails—and then Slack. So I just get rid of Slack."

Similarly, Cara considered adding Slack to her course but did not because she recognized integrating it was not a priority when she maintained,

> I did not use Slack because I just wasn't real familiar with it. I don't know how often I would use it. And I was teaching a class for the first time. One of mine was new. So I felt a little bit. I needed to focus on that more so just utilizing Canvas as my main form of technology for my course.

Recognizing her personal capabilities also affected Susan's decisions about the technologies she chose to integrate when she affirmed,

> This was a big learning semester for me because I delivered both my classes via Zoom. . . . it was a learning experience, and the students were so gracious about me learning my goal. . . . learning how to manage the chat box. . . . just to learn how to orchestrate the Zoom breakout rooms. I use them every class, but, boy, was that a work in progress. And then learning how to record my sessions.

Feelings of Support. For half of the interviewed FAs, knowing they had support structures in place contributed to their teaching experiences and uses of technology during the semester. With assistance and encouragement from others, FAs knew they were not isolated. Support elements included asynchronous and synchronous content in the OCoP and relationships with colleagues.

One FA specifically referenced the OCoP support as being important, as noted when Viv commented,

> With yours [technology resources and training], and your support and even just reading through that [OCoP content], I got a little bit more details on support and then even meeting in person [virtually]. I don't know if that was kind of the Slack pieces, you know, because you would notify us of the meetings.

For Greg, his confidence and assistance derived from one colleague on whom he depended. He indicated this when he shared,

> But, you know, partnering with [the colleague] like that. I mean, he was the senior member of the partnership, and I was the apprentice. But that just gave me such a sense of belonging and making things work. And it just, it just gave me a sense of comfort to have somebody like that. And it's very hard to achieve that feeling totally online.

Discussing the resources provided in the OCoP, Cara said, "I do feel like there was a lot. . . . So, I mean, I was very grateful to have all of that."

Risk-taking to Learn. Two FAs, when describing their decisions related to technology integration, did not fear trying new tools or strategies. Both took risks during the semester as they changed plans based on their new understandings of different elements of technology integration. Although both had differing levels of confidence when approaching unfamiliar processes and applications, they were enterprising, nonetheless.

Viv described her approach to engaging with new digital tools when discussing using tools she discovered in the OCoP when she said,

> You know, it's taken me a long time. I just have got . . . I get to the point you realize it's okay. You're gonna . . . you're never gonna just really. You're always scared you're gonna mess something up in your presentation or . . . you just got to try it. And I think that's why, like, the students. I'm like, 'all right, guys, I'm doing this Pear Deck,' and they're helping me. I go, 'I gotta figure out. . . I want to make sure you guys can see your work.'

Another FA, Susan, did have fear when using technology with which she was not familiar but learned from her experiences. She discussed the trials related to recording her synchronous Zoom sessions to share with students asynchronously when she declared,

> Learning how to record my sessions. You know, going back and learning, oh, I can't edit this, you know, laughing. That first session where, you know, you forget to turn it off at the end, and now I'm having a personal student conversation. And now I learned that it's a whole process to edit Zoom.

Technology Integration Knowledge from Familiar Sources Outside of the OCoP. Each FA interviewed relied upon knowledge from other colleagues,

trainings, or sources that were not from within the OCoP. Some still engaged with the OCoP, but some did not, in part, because they had other contacts with whom they consulted or depended on for technology integration knowledge, learning, and support. For most FAs, their familiar sources were trusted colleagues. FAs who chose to advance their technology integration knowledge consulted individuals and groups whom they knew, felt comfortable with, and found to be accessible. Those advisory individuals included instructors teaching similar content, professional developers in FAs' full-time organizations, and college leaders presenting workshops or learning sessions.

Susan noted she had meetings with other instructors teaching the course she was teaching. Jenn said she also attended similar meetings for the course she taught. Others had training sessions, resources prior to the start of the semester, so they incorporated that recent learning into their instruction. Allie had been teaching at a virtual school before starting her assignment in MLFTC and applied what she learned there to her instruction when she commented,

> I actually did all of our back-to-school trainings with [name of school]. And so a lot of my knowledge and background from training came from there. So, I mean, we talked about Nearpod, Slack, Pear Deck, Google, you know, everything. So that's kind of what I carried over into ASU.

The college offered numerous training sessions related to technology integration during the months prior to the semester's start, and several FAs mentioned learning during those sessions. Leah said, "I attended a couple of workshops . . . from the beginning of the semester." Cara also noted this as an external source when she mentioned,

> I took a couple of the classes beforehand that talked about Jamboard, and Pear Deck, and some of those things. So I feel like I got some of my ideas based off of the courses that I took before my session started.

Development of Technology Integration. *Assertion 3 - Instructors gained technology integration knowledge, improved technology skills, and applied their learning in their teaching experiences at levels appropriate to them.* This assertion derived from theme-related components (a) improved skills, (b) gained knowledge, and (c) technology problem-solving through collaboration with others.

Improved Skills. Five of the FAs interviewed discussed an increase in their technology skills–functional and operational use of digital applications. Responses from the open-ended post-intervention survey also included this concept. For some, skill improvement resulted from OCoP participation. Others developed skills based on interaction with other sources. Skill development related to FAs' elevated understandings of digital applications and being able to capably use tools for instruction. Knowing how to complete administrative tasks within Google applications and being able to effectively use advanced features in Zoom were some of the examples FAs shared. Their discussions of these new skills exhibited growth.

Cara talked about changes in her skills when she said,

> I think just the more you use it you become familiar with it or comfortable with it. You know, when you do a Jamboard, I feel like sometimes, or even do a Google Slide, that you're sharing and they're inputting information. That was something else I would do is like a Google Slide or Google Doc where they'd add information. You know, sometimes you go in and you forget to make it editable for everybody, and you're, like, oh . . . Or I need to request access for them. You just, you just, sometimes you just forget those

components. I felt like I got more successful at that as we went on. Same thing with the breakout rooms.

Some FAs noted changes in their uses of Zoom as improved skills. Susan said her new skills included "contributing through delivering content via Zoom and delivering content with this new platform [virtual delivery]." An anonymous participant who responded to the survey mentioned learning content delivery through Zoom as a new skill as well. Yet another specified "breakout rooms and using co-presenters" in Zoom was something improved upon this semester.

A response from the open-ended survey focused on specific learning related to digital tools. The participant said, "I learned how to deliver content via Zoom, how to engage students via Zoom, how to further my skills using Canvas, and how to use digital rubrics." Finally, another survey participant mentioned learning "how to video and upload," which is evidence of skill development.

Gained Knowledge. The concept of improved knowledge related to technological pedagogy also appeared in some of the post-intervention survey responses and from seven of the eight FAs who were interviewed. Some of their added knowledge was derived from the OCoP and other knowledge came from different sources. Describing additional knowledge, FAs discussed specific pedagogical practices which elevated instruction using digital technologies. Often using the word 'learn,' FAs described their new knowledge as benefitting students and attributed learning to sessions and students' contributions or ideas.

A survey participant noted, "I learned how . . . to engage students via Zoom."

Fiona discussed learning a pedagogical strategy from her participation in the OCoP when she said,

> You know what else I learned? Because I had to do it was just how to upload and integrate it into Canvas. And that was helpful for me. I didn't know

about, I don't know if you did a session or where I learned. . . I know I learned it. I probably got it off Slack. How to do videos and discussions. Yeah. Yeah. Be more interactive. I think you did a session on that. And I use that. And I thought that was great.

Viv said she added to her technology integration knowledge by participating in the OCoP when she affirmed,

> It gave me a variety and brought new things. My master's actually is in curriculum, instruction, and technology, so I got a lot of basic stuff like the screencast, you know, being able to record your screens, keeping students interactive, not just setting up and, you know, you're presenting on your screen. How to do that.

Students contributed to technology knowledge gains in FAs. Cara was teaching two courses, and students in one of her courses shared information with her that she used in her other course as noted when she claimed,

> For my other course, [it] requires them to use different technology for one of their presentations. So they introduced a new technology piece to the class. . . . It was really nice because sometimes I would learn something new from them to something that I hadn't used before. So each week we would introduce them to something new technology-based that way too.

Viv also experienced learning with her students. Her students wanted to try different methods for recording their mathematics problem-solving. Viv detailed this situation when she explained,

> One of the kids . . . there was one that said, 'Hey, why don't we just use Zoom?' And I was, like, 'If you can make it happen and I can see you in that corner [of the recording] solving, go for it.' So then, I went ahead and started looking into it, and I found like four different options that they could easily

use, and I gave them all those options. And told them that they could choose, and they did. I mean, they did great. So, yeah, we just learned. It's like I keep learning and learning. And it's, like, I like it.

Technology Problem-solving through Collaboration with Others. Changes in integration of technology occurred when some FAs worked with colleagues or students to solve problems they faced during instruction. Some FAs discussed sharing ideas about different tools or discovering the right strategies to achieve learning goals. Notably, instructors benefitted from sharing their own experiences with full-time faculty. Additionally, some FAs addressed technological issues by testing solutions alongside their students. This knowledge transfer among different instructor types and students resulted in shared learning.

Viv was eager to collaborate with both colleagues and students and discussed her experiences with another mathematics instructor when she asserted,

> I remember [instructor's name] was telling me. She's, like, 'I don't really know how to do this.' I got a chance to work with [her] because she asked if she could work with me for a few hours and consult her. And I told her, no, I wouldn't consult her, but I would collaborate with her. And so we worked together for about three hours one morning. And I just was going through and showing her what I was doing in my class, which was funny because I thought my, sometimes you look at your stuff . . . I think I just, and I read her stuff. And I'm, like, oh my goodness, you know. Mine is nothing compared to the level of hers, but she loved what I had. And she's, like, you're just so interactive and engaging and you're constantly having the kids, you know, go in. . . . It was great.

When using Pear Deck with her students, Viv and her students realized the application had different options for the instructor to display students' responses. Viv and her students collectively learned how to use the functions, as Viv explained,

> We are all laughing because I'm, like, they're, like, well, I think they're just doing this. I go, 'Is this somebody's work?' Like, no, I think that's everybody's work, so it was just funny. We just, like, kind of like problem solved. It was funny when they learned so much. They talked about that a lot. I noticed in their signature lesson plans they wrote a lot more are using Pear Deck. They are using that tool to have the kids interact and solve.

Online Community of Practice Reflections. *Assertion 4 - Instructors who engaged in the OCoP found it valuable and benefitted through identified knowledge gains, increases in self-efficacy, and elements of community.* This final assertion was based on three theme-related components including (a) OCoP engagement levels, (b) reflection on OCoP engagement, and (c) intention to revisit OCoP.

OCoP Engagement Levels. FAs who engaged with the OCoP did so at various levels and described different ways in which they were active in the community. The majority of respondents in the post-intervention survey outlined their participation as users. FAs seemingly classified their own engagement by referring to themselves as 'consumers' and 'lurkers.' Their reflection on their use levels revealed they had specific reasons for accessing the OCoP and determined how they would use the spaces or contribute to them after thinking about their own expertise. Sharing or engaging, then, occurred based on confidence levels and their perceived benefits to the greater community.

For example, one participant said, "I was mostly a consumer of content." Another commented that she "received information" from participating in the OCoP.

Another survey participant wrote, "I just read it and looked up all the tech that people were mentioning."

Greg explained his participation in the OCoP depended upon his confidence levels when he asserted,

> I was what you would call a lurker. That's kind of like the way I am on Facebook, too. I'd much rather read than contribute. I guess, you know, I guess it's just kind of, kind of, like, I'm still a newbie at teaching this course and still don't think I need any competence building this point. Now I feel really good about it.

Another level of engagement described by FAs was equivalent to limited interaction. They did more than consume the content but did not contribute. For example, Fiona said her contributions were "nothing more than just a like [indicating to others she liked the content]." Adding a reaction to a post in Slack, however, was a higher level of engagement than reading content.

Jenn read the OCoP content consistently but did not contribute more than 'liking something' she saw in Slack and explained why when she said,

> Slack . . . I did not engage with it as far as making comments. I did use some emoji things throughout it, and that's where I think my comfort level was. . . . I would click through several of the different elements that are in Slack, and I really liked reading what other people were doing. Padlet seemed to be really popular. And I didn't want to put a negative out there if people were really happy with it. So if you don't use videos or you don't realize that that's also an aspect of a lesson . . .

FAs who participated at a level beyond minimal interaction did contribute some content. A survey participant noted, "I believe I added a post early on."

Moreover, Leah said she contributed to the OCoP as the semester was starting when she commented,

> I did a couple [contributions]. All at the beginning of the semester. Addressing where you can find this, some information here and there, because I found it, and some people are not familiar with that. So I just provide it. But during the semester, no. During the semester, I feel like [the semester is] already starting and supposed to know already!

Reflection on OCoP Engagement. Discussion about participants' experiences within the OCoP included various comments about why they participated as they did, what they learned, and their plans for using the OCoP during future semesters. Some FAs sought validation and looked for particular assistance in the OCoP. Others were seeking interaction and conversation. Even FAs who felt knowledgeable found value in the OCoP and visited it for expanding learning, recognizing it as a place to find effective information.

Some FAs gained self-efficacy and confidence through the affirmation they received by participating in the OCoP as noted when Greg said,

> I think it was more validation than anything else. That we all seem to be suffering the same issues. And that was a big hardship, but it's like what is the best way to do something. And so it's always good to hear what other people are doing. And then, if it agrees with what you're doing, it feels so much better.

About OCoP involvement, Viv said,

> You guys are bringing new resources to it. And even though they weren't necessarily new to me, you kept bringing them. And then what I liked is when we were able to interact and share those. . . . It was nice to be able to just, to me, to afterwards and then have a more extended conversation on that.

Through Fiona's response about the relevance of the OCoP and its resources, she revealed her thoughts about the community when she described the usefulness of content,

> Everything! So PlayPosit, the Pear Deck lesson. A lot of times I went there if I needed to learn how to, how to . . . I was, like, oh, I think I saw this and I just need to log back into Slack and see where I saw that technology piece I could use. Then I would replay it myself while I was learning how to use it. I did that with PlayPosit. That's just the one that's sticking out in my mind. But I went there a lot. Oh, and then I joined the IgnitED Lab based on the Slack. So that I could get some trainings there too. . . . The resources that were curated on there, and then the links to get training on how to use them was pretty valuable.

Although Allie indicated she had a wealth of technology integration knowledge before starting her teaching assignment, she did need help learning about the pedagogical options in Canvas and noted,

> I did use your video of Canvas when I first got on. Because I was, like, I'm not quite sure how to use [this]. I hadn't gotten that far to using Canvas, so I did watch your video to see how to do different features within that.

Intention to Revisit OCoP. Three FAs remarked about their plans to review the content and resources in the OCoP next semester because they were continuing to teach in the college in their part-time roles. Two of those FAs were active users during the semester. The other had limited participation in the digital spaces. Identifying the OCoP as including relevant and useful information, both FAs explained their plans to expand their engagement with the digital spaces when teaching during terms in the future.

Cara, an active participant, recognized her limited available time to pursue the content in the OCoP had affected her use but she was going to follow up when she said,

> It's [the OCoP] definitely something that, obviously we're going to be still in the same type of learning model in the spring [remote], so I would like to incorporate some of the different ones. . . . I have a lot of the same students, so I want to incorporate some different, you know, activities and technology pieces, so that'll be helpful to go back and have time to look at some of that and incorporate it now.

Allie had engaged with the OCoP in a limited way, but she shared she intended to participate more next semester when she stated,

> I definitely would like to, and I would like to . . . I actually was looking there towards the end of the courses. . . . I definitely want to use, or take advantage, of some of the trainings. . . . I'm hoping that there's another one again. Just so that I can stay current . . . make sure that I'm, like, trying out different things and utilizing them.

Summary of Interviews and Open-ended Comments on Survey. Taken together, the data showed there were four themes deriving out of the interviews and open-ended survey responses. Participants' data related to a) discussion of instructional technology integration, b) factors affecting technology use and integration, c) development of technology integration, and d) online community of practice reflections. Themes represented FAs' overall methods for teaching with technology and how they developed their skills and knowledge. The themes also represented how FAs perceived the OCoP, why they used it, how they used it, and how they applied the information they found within the OCoP.

Qualitative Data Results from Lesson Analyses

Using the lesson analysis protocol, each instructor's lesson resulted in an assigned score for three different constructs. Those constructs were pedagogical technology use, technology skills, and self-efficacy related to technology integration. Nine items on the protocol measured pedagogical technology use. An example item was "Instructor plans the use of at least one technology during instruction. Two items measured technology skills. An example item was "Instructor integrates technology tools in content development in the LMS." Four items measured self-efficacy. An example item was "Modeling of technology for learning is evident in the lesson content." The complete protocol has been made available in Appendix D.

Pedagogical use was evident when FAs engaged students in using digital technologies to learn and demonstrate learning. Providing students with feedback by using technology and assessing their learning were also methods for integrating technology and pedagogy. An example of pedagogical use in FA's lessons viewable in Canvas included an instructor, Olive, creating a digital gallery walk of students' presentations using Google Slides and Zoom. Another pedagogical use implemented by a different instructor, Jenn, was collecting students' reflection responses about a learning objective in the chat function in Zoom. Instructors displaying technological skills organized their course content effectively in Canvas, presented content well using design principles in digital content they created and shared, and integrated tools and assets effectively in the LMS, digital content, and course delivery. For example, Susan recorded her synchronous sessions in Zoom and shared the links to the recordings in Canvas. Another instructor, Rena, shared an icebreaker question with her students and collected their responses using Zoom chat.

FAs who displayed high levels of self-efficacy modeled technology and taught their students how to integrate technologies in their own lessons. High levels of self-

efficacy were evident when FAs frequently used technologies for administrative tasks, instructional delivery, assessment, communication, and collaboration. For example, Olive created resources for her students to learn different digital methods to create lessons and present them. She supplemented their learning with several instructional guides and detailed instructions supporting her students in their learning. Jenn effectively integrated different tools to meet specific objectives and provided guidance and explanation related to the purpose of the tools.

Data below displays the three construct scores for each instructor and that instructor's respective lesson. For Rena, Susan, and Jenn, the lessons corresponded to the same time blocks. Lesson 1 was during the first three weeks of the semester. Lesson 2 occurred during weeks 4 and 6. Lesson 3 was from weeks 7 to 9. Lesson 4 was during weeks 10 to 12. The final lesson, lesson 5, occurred between weeks 13 and 15. Knowing that the beginning of the semester and end of the semester may not accurately depict an instructor's technology integration patterns, I did not analyze the first week lesson or last week lesson for any of these participants. Olive was teaching a Session A course, which meant she delivered the same amount of content as a 15-week course but in an accelerated format of 7.5 weeks. Due to the limited number of lessons available to analyze, I did analyze the lesson from her first week. The data for Olive's lesson analyses has been provided in Table 12.

Table 12

Lesson Analyses Scores for Olive

Lesson	Pedagogical Use	Skills	Self-efficacy
1	7	4	2
2	18	4	6
3	18	4	6
4	18	4	6
5	18	4	6

Note. Pedagogical Use max = 18, Skills max = 4, Self-efficacy max = 6

Evaluating Olive's results revealed she likely had experience teaching with digital technologies. For lessons two through five, she received the highest scores possible in all categories. The first lesson was an outlier that aligned with the notion that the first week of a course was not a reliable representation of instruction due to administrative details and transitioning into the course content. Therefore, reviewing all lessons aside from the first shows Olive to have been skilled at teaching with technology prior to the start of the semester. She consistently engaged with her students using technologies, supported their learning with them, and modeled technology use throughout her lessons. She leveraged her technology skills to share learning, communicate with students, provide feedback, and assess their knowledge. Olive used the OCoP at a minimal level. She spent 48 minutes in the Canvas section but only viewed six pages of content. She was not visibly active in the Slack portion of the OCoP. I did not interview Olive so cannot add detail other than what is visible in the Canvas reports and Slack workspace.

Data depicting Rena's scoring results on the lesson analysis protocol for each lesson has been provided in Table 13.

Table 13

Lesson Analyses Scores for Rena

Lesson	Pedagogical Use	Skills	Self-efficacy
1	13	4	5
2	15	4	5
3	16	4	5
4	18	3	4
5	8	2	3

Note. Pedagogical Use max = 18, Skills max = 4, Self-efficacy max = 6

Rena seemed to achieve some gains during the semester. The last lesson was an outlier when compared to her other scores. Eliminating that from analysis, then, Rena did develop her pedagogical use. She had a consistent increase in those scores

as the semester progressed. By her fourth lesson, she was providing her students with opportunities to engage with technologies, and she was using technologies alongside her students. Her technology skills and self-efficacy scores, however, did not follow that pattern. In fact, both decreased. The decreases were only by one point in each construct so it was difficult to draw conclusions about these scores. Rena was not an active participant in the OCoP. She did log 12 page views in Canvas but spent less than one minute of time doing so. Additionally, she did not contribute to public channels in Slack. She did not participate in an interview, so I am unable to describe her participation in further detail.

Scores for the third participant, Susan, in the lesson analyses have been provided for each lesson and each construct in Table 14.

Table 14

Lesson Analyses Scores for Susan

Lesson	Pedagogical Use	Skills	Self-efficacy
1	11	4	4
2	4	2	2
3	12	2	4
4	14	2	4
5	11	2	4

Note. Pedagogical Use max = 18, Skills max = 4, Self-efficacy max = 6

Susan's scores indicated she did not exhibit remarkable changes in growth during the semester. Of all participants, Susan's scores were lower than those of the other instructors. She started the semester at a lower level than others and generally maintained those levels for the duration of the semester. Regarding pedagogical use, she did not integrate technology frequently, and when she did, her students' opportunities to use technology were limited. The content shared in Canvas was unorganized and confusing in various lessons, which attested to her lack of technology skills to create and manage digital content. She did not model technology

to her students or provide them with guidance when they engaged with technology. Notably, she demonstrated almost no activity in the OCoP. She logged one page view in the Canvas portion. Her time spent in the Canvas space was less than one minute. Likewise, she did not publicly contribute in the Slack workspace. Susan did participate in the interviews and explained she did not use the OCoP because she had other connections or sources for developing her knowledge and skills. She also stated she has never used Slack and did not want to learn that tool during an already-busy semester.

Jenn was the final participant for lesson analyses, and her scores have been presented in Table 15.

Table 15

Lesson Analyses Scores for Jenn

Lesson	Pedagogical Use	Skills	Self-efficacy
1	14	2	4
2	17	2	5
3	17	2	5
4	17	2	5
5	18	2	5

Note. Pedagogical Use max = 18, Skills max = 4, Self-efficacy max = 6

Data in Jenn's profile indicated a developmental pattern. Her pedagogical use scores increased between the first and second lessons and were maintained at that increased level through the fourth lesson. She reached the maximum score in her fifth lesson. Considering her self-efficacy level, she increased and maintained the increase. She did not achieve the highest total possible though. The construct on which Jenn did not display growth was skills. Although she improved pedagogical use and clearly focused on her students learning with technology, she did not make changes to improve her basic technology skills. Her slide presentations were packed full of small text and images that were not sized appropriately. She also frequently

pasted website links on her slides and in content shared with students rather than embed the links. The digital content she created revealed she lacked an understanding of some accepted standards of technology use. Jenn showed extensive use of the OCoP, especially in Canvas. She was active in the space for 1238 minutes over the course of the term. That included 362 logged page views. I interviewed Jenn, and she was thorough in describing her use of the OCoP. She stated she was active in Slack as well. Although not visibly participating, she stated she "read everything" shared in the channels in Slack.

Summary of Lesson Analyses. Collectively, data from the lesson analyses provided scores that depicted summarizations of three constructs for the four FAs. Those constructs were pedagogical use of technology, technology skills, and self-efficacy as related to teaching with technology. Considering the construct scores and levels of engagement with the OCoP is also informative.

Lesson Analyses Interpretive Notes. For each lesson analysis, I wrote interpretive notes about the lesson content, materials, and resources shared in Canvas. The notes included descriptions of how instructors and students were using technology, instructor-created digital content, how the instructor shared the content, the purposes of the technology use, and my overall observations about the technology integration in the lesson. I then used structural coding (Saldaña, 2016, pp. 98-101) to code the notes. I wrote down a few concepts from the protocol that guided my coding: self-efficacy, pedagogical technology use, modeling, active technology use by students, instructor technology use, technology skills, LMS use, differentiation. After coding with those in mind, I recoded the data in a second cycle using pattern coding (Saldaña, 2016, p. 236). This resulted in three themes or orientations, which I applied to all lesson analyses notes to craft individual narratives for each of the participants. Themes have been provided in Table 16.

Table 16

Lesson Analyses Interpretive Notes Orientations

Orientation of developing digital pedagogy	Orientation of adequate digital pedagogy	Orientation of highly-proficient digital pedagogy
• Active technology use by students • Pedagogical technology use • Functional technology use • Limited self-efficacy	• Active technology use by students • Pedagogical technology use • Functional technology use • Modeling instructional technology • Evidence of self-efficacy	• Active technology use by students • Pedagogical technology use • Functional technology use • Modeling instructional technology • High self-efficacy

Orientation of Developing Digital Pedagogy. Orientation-related components classifying an instructor as developing digital pedagogy capabilities included multiple examples of students actively using technology, evidence of pedagogical technology use, elements of functional technology use, and limited self-efficacy. Although these elements were evident in the instructor's lesson analyses, they were not consistent throughout each lesson. In other words, an instructor could have only one instance of active technology use by students but still fit into this orientation.

Susan was the lone participant categorized as developing based on the interpretive notes and subsequent coding. She displayed limited self-efficacy in her lessons. For example, Susan's students handwrote entries about their learning in a notebook during the semester, and Susan asked them to submit uploaded images of their entries rather than provide students with options for digital creation. On other occasions she did not change her limited technology integration even as the semester progressed. Students had only two opportunities, out of the five lessons, to

actively engage with technologies during class sessions. In all lessons Susan's technology use was at a functional level, so she used technology to complete basic tasks. For example, she used Zoom to deliver content during each lesson and used the chat function in Zoom to interact with students. Pedagogical technology use was evident twice, occurring during the fourth lesson. For that lesson students viewed a pre-shared video in advance of the synchronous session and engaged in class discussion about their learning from the video using Zoom.

Orientation of Adequate Digital Pedagogy. For an instructor to receive the classification of adequate digital pedagogy, the instructor's lesson analyses would have examples of all elements noted in the developing category as well as modeling instructional technology and evidence of self-efficacy. Similar to the previous orientation, an instructor may have had one example exemplifying evidence of self-efficacy to fit within this orientation.

Jenn's analyses showed her to have adequate digital pedagogy capabilities. Although she did model technology use for students, she did not include specific modeling on a consistent basis. Visible in each lesson, however, was students' active use of technology. Jenn provided multiple opportunities for students to engage with digital tools while learning. For example, in her third lesson, students collaborated in small groups to complete a Google Document template. They also reflected on their newly learned knowledge by completing an exit ticket using a Google Form. Pedagogical use was also evident in each lesson. In the fifth lesson, for example, Jenn's students viewed a poetry video and used the Zoom chat function to identify the type of poetry in the video. A discussion followed. Missing for Jenn was the consistent modeling of digital technologies and the explanations for her students to transfer their technology use to their own instructional experiences. Jenn also did not display high levels of self-efficacy, which was related to her limited modeling. Jenn's

lessons also revealed she misused some technologies or did not use them to their fullest capabilities. For example, Jenn used Google slides templates for each lesson. Instead of eliminating content included in the templates, she kept the slides in the file she shared with her students, which could be confusing. This resulted in very long slide presentations shared with students that had numerous irrelevant slides at the end. Although Jenn integrated digital technologies in teaching and learning, she demonstrated some deficiencies.

Orientation of Highly-proficient Digital Pedagogy. Orientation-related components designating instructors as having highly-proficient digital pedagogy capabilities included consistent examples of the elements mentioned in the previous orientations. Additionally, evidence of high levels of self-efficacy were also noted.

The first instructor with this orientation was Cara. Each of Cara's lessons were comprised of examples of her effective technology integration and opportunities for her students to actively apply technology when learning. For example, in her first lesson, Cara included two separate activities for students to co-create using Google Slides. Her slide presentations were attractive and concise. The content she shared with students in Canvas was organized and easy-to-follow. Evidence of her high self-efficacy was apparent as she often provided students with multiple options for learning and demonstrating their learning. For example, her third lesson required students share their writer's notebook. Students could choose their preferred medium for completion and submission, which Cara clearly identified for them. For that assignment students could choose to handwrite their notebook and upload photos, type in Word and upload, type in Google Docs and share, or write directly into Canvas. Cara's technology fluency was clear in the analyses of her lessons.

Olive also demonstrated the highly-proficient orientation. Each of the lessons, aside from the first, which was the initial class session of the term, included

purposeful and clear modeling of digital technologies. An objective of the second lesson was students' understanding of technology applications available to them as instructors, and Olive modeled examples for them. Olive also modeled how to meet the needs of diverse learners using technology. Her frequent modeling supported her high level of self-efficacy. Another example of high self-efficacy was Olive's detailed instructions guiding students. Most of her lessons included such supports with one example being an illustrative guide explaining how students should teach a lesson using a digital technology, record the video of the lesson, and submit. Olive's integration of technology and the supplemental content and resources she provided her students were evidence of her advanced technology fluency.

Summary of Lessons. Observational notes from the lesson analyses led to interpretations about the instructors' methods and abilities as related to instructional technology use. Three orientations were evident through my interpretations. FAs demonstrated orientations of a) developing digital pedagogy, b) adequate digital pedagogy, or c) highly-proficient digital pedagogy.

CHAPTER 5

DISCUSSION

Implementation of this action research project is based on evidence revealing a lack of consistent and complete support, especially for integrating technology into instruction and related professional learning opportunities, for part-time faculty members acting as teacher educators in the teacher preparation programs within our college. Previous chapters explain the need for accessible technology-related professional development, abundant instructional resources, and connections to college communication channels and resources. Chapters also include the description of an online community of practice (OCoP) as an intervention to provide resources, learning options, and networking pathways for part-time faculty members as a possible solution to this problem. Investigating the use and influence of the OCoP intervention is the focus of the study. The study design includes self-reported data and observational data to aid in the examination of the influence of the OCoP on instructors' technology use, pedagogical technology practices, technology skills, and related self-efficacy. In this chapter, I provide a discussion of the findings of the study and implications for practice and future research.

Complementarity and Integration of Quantitative and Qualitative Data

Merging the quantitative and qualitative data together provides a pathway for integrating the data. This side-by-side comparison method (Creswell & Creswell, 2018) leads to areas of evident complementarity among the data. Examining both types of data collected for evidence of similar characteristics of the phenomenon to identify overlapping results is a method for better understanding and explaining the phenomenon and is referred to as complementarity (Greene, 2007; Greene et al., 1989). Results from the integration of the current data reveal complementarity in the primary findings.

First, based on the ANOVA results, the quantitative data show significant increases in TPACK, TETCs, and self-efficacy constructs. The change for TPACK was 0.76, the change in TETCs was 1.03, and the self-efficacy change was 0.73. These results are evident in the interview responses as well. FAs explain how they integrate technology into their instruction, which includes TPACK-related references as they discuss how they choose technology tools and strategies to supplement their teaching as they deliver their course content. In interviews, FAs also describe their functional technology use, which relates to their changes in the TETC construct. Finally, some FAs in interviews mention changes in their confidence levels and abilities when teaching with technology, which corroborates the change in self-efficacy observed in the quantitative data.

When considering the levels of use of the OCoP by FAs, quantitative data from Canvas and Slack reveal various levels of use. The majority of those who use the OCoP engage for just over an hour, according to Canvas data, with the highest number of active Slack members in a week being 37. The analytics show more active users in Canvas than in Slack. FA interviews support these data because some said they do not use the OCoP at all and others describe their use levels as including some engagement. Also in interviews, FAs indicate more use of the Canvas space than the Slack space. However, the data from the open-ended post-intervention survey provide differing results. FAs substantially over-report their use of the OCoP by recounting their time spent in the OCoP with a mean of 277.35 minutes.

Quantitative, analytic data provides one picture of the data describing the use of the OCoP and the influence of it on FAs' teaching practices and professional development profiles. Consulting the interview responses and lesson analyses along with their interpretive observational notes supports the results by adding another layer of data and detail. The qualitative data better explains the numerical data, and

the complementarity that exists within the study leads to a richer understanding of the findings.

Discussion of Findings

Results of this study focus on the activity of FAs in the two digital spaces within the OCoP and the potential influences of the OCoP. Data describing FAs' use of the OCoP intervention, their perceptions of the OCoP, and the potential effects of the intervention on teacher educators' (TEs') pedagogical technology use, technology skills, technology use, and self-efficacy resulted in four prominent findings. Discussion of the findings appears in four sections: (a) FAs report increases in technological integration skills, improvements in digital pedagogy, and increases in self-efficacy; (b) FAs who engage with the OCoP experience gains in pedagogical technology knowledge, technology skills, and self-efficacy; (c) FAs' reported use of the OCoP is not supported by the OCoP analytics; and (d) FAs exhibit different orientation levels toward digital pedagogy, which may change due to activity in the OCoP. Related theoretical perspectives and literature connections are included in these sections.

Increases in FAs' Technological Skills, Digital Pedagogy, and Self-efficacy

Data show substantial increases in skills and behaviors related to TPACK, the TETCs, and self-efficacy. FAs anonymously reported improvements when responding to the retrospective, pre- and post-intervention surveys. Some interview responses also include evidence of positive changes. Although technological skills and their development is not a primary focus of the content of the OCoP, participants report this as the area of highest growth, 1.03 points. By comparison, TPACK scores increase by 0.76 point and self-efficacy scores change by 0.73 point. Also during the interviews, FAs report growth in all areas. Not all FAs report the same type of improvements nor improvements in all constructs specific to them individually, but

taken as whole, all interviews include some references to increases in all three constructs.

OCoP Influence on Gains in Pedagogical Technology, Technology Skills, and Self-efficacy

Responses in FA interviews and anonymous data from the retrospective, pre- and post-intervention surveys point to experiences within the OCoP as possible reasons for improvements in TPACK, TETCs, and self-efficacy. Of the 12 participants who responded to both the retrospective, pre- and post-intervention assessments, ten report they had used the OCoP. Two said they do not use the OCoP at all. The range of time spent in the OCoP is quite large, from five minutes to fifteen hours, according to reports by the ten who say they participated in the OCoP. Although the total experience time for each varied, and not all who report gains in the three constructs of TPACK, TETCs, and self-efficacy are actively engaged in the OCoP, enough of the FAs take part to conclude participation in the OCoP influences increases in these areas. Likewise, some of the FAs who participate in interviews mention specific learning from the OCoP to which they attribute their improvements in the three constructs.

Gains for instructors who participate in the OCoP match findings in related research. Notably, Macià and García (2016) also find teachers who are participants in various networking opportunities online improve in areas related to professional development and self-efficacy. Karam et al. (2018) also find similar results in their study of science teachers. Abbit's (2011) results also show there is a connection between TPACK (Mishra & Koehler, 2006) and self-efficacy (Bandura, 1977), which is consistent with the results in this study that depict increases in both constructs. However, the learning module on technology integration foundations that included the content about TPACK is a component rarely accessed as part of the OCoP. In

fact, only one of the FAs participating in interviews engages with the learning module. Canvas analytics show only seven FAs view the module. Therefore, few FAs have experiences with the TPACK framework as a tool to guide their understanding of the connections among technology, pedagogy, and content knowledge. Still, the framework informs the development of the space, the resources within it, and the synchronous and asynchronous learning sessions included in the OCoP. Those elements could account for some of the increases in TPACK construct scores. Gains in technology skills and pedagogical technology use and understanding, as evidenced in the TETCs (Foulger et al., 2017) construct increases, are attributable in a way similar to TPACK's influence. Professional learning opportunities, resources, and content development is founded in some of the TETCs' competencies and intended to support and strengthen those elements for FAs.

Varied Levels of OCoP Use

Although encouraged, introduced, and promoted specifically to FAs as a location for instructional resources and networking, the majority of FAs are not actively engaged users of the OCoP. Of 153 total FAs in the Slack workspace, the highest number of weekly active members is 37, and that is not consistent. The range of active members is 7 to 37. The total number active in Slack overall is 43 FAs. Notably, those who respond to the post-intervention survey with estimates of their use inflate the time spent in both digital spaces. Analytics from Canvas and Slack do not support the self-reported responses about time or level of activity participating in the OCoP. Reviewing the FA-reported data, which is from 17 participants, the mean is 277.35 minutes active in the OCoP with a range of 2,395 minutes. Canvas data indicate a mean of 66.52 minutes and a range of 1,236 minutes. Granted, the Canvas analytics only provide data from one of the digital spaces. Slack analytics do not include reports of total time spent in the space.

However, viewing the number of messages posted, reactions logged, and active weekly members, Slack data also indicates FA use of the space is likely less than they reported.

Discovering inconsistent and mixed levels of participation by FAs aligns with research related to communities of practice. Karam et al. (2018) find STEM teachers' activity in two OCoPs is erratic and does not follow a sustained pattern. Related to that, Wenger et al. (2009) suggest technology makes membership to OCoPs easy, and due to ease of access, participants are involved in more than one, which could affect their participation levels. FAs, in their open-ended survey responses and interviews, frequently mention low participation in the OCoP because they lack the time necessary to connect with others for assistance or learning in such settings. They do not rise to high levels of participation, in part, due to their part-time status, limited compensation, and other responsibilities. For some FAs time devoted to their teaching assignments is already limited so engaging in an additional community requiring more time is difficult. Nevertheless, they have other CoPs or OCoPs on which they can rely. Also of note is the limited number of FAs who participate in the Slack space. Macià and García (2016) find technological ability did influence use of OCoPs. During the interviews, some FAs mention they are unfamiliar with Slack and do not know how to use it so they avoid it altogether.

For those who are active in the OCoP, few share their own ideas or instructional strategies with the community. Participation levels primarily remain at consumption and lurking. This is consistent with Tseng and Kuo (2014), who find instructors in their study share in a limited manner but do so based on the development of high levels of self-efficacy. Data revealing increases in self-efficacy from this study, then, point to the notion that FAs involved in the OCoP for long

periods of time, perhaps more than one semester, might be more willing to put forth their technology integration knowledge and share it with the whole community.

Digital Pedagogy Orientation Levels and Influence of OCoP

Evidence of varied orientation levels toward digital pedagogy is apparent in the lesson analyses. There is limited evidence of the development of the orientation levels based on the OCoP. Jenn is the only FA whose lesson analyses display a developmental pattern. The pattern is not particularly strong but is traceable. Three additional FAs, whose lessons are included in the analyses, are not consistently active users of the OCoP and its resources. Jenn, however, is. Jenn, in her interview responses, reports reading through OCoP content in both Canvas and Slack for hours each week. Canvas analytics support her description indicating she spends 1238 minutes or nearly 21 hours during the semester looking at and gaining information from the Canvas component of the OCoP. Data further show she reviews 362 pages of content, which includes repeated visits to some pages. Slack analytics are anonymous, but Jenn describes her use of that digital space as similar to her time in Canvas. She says she read through all of the posts, looked up information based on the content, and added reactions to content she found useful. She refers to her weekly use by saying she dedicated "hours" each week to gathering knowledge from the OCoP.

Considering the other three FAs who participated in the lesson analyses, their OCoP use was much less than Jenn's. Olive participated only minimally in the OCoP, spending just under 48 minutes in the Canvas course. I did not interview her so I do not have data about her Slack use. Rena spent less than one minute in Canvas and viewed only 12 pages. Not having interviewed Rena, I cannot comment on her Slack use. Susan's time was also less than one minute in Canvas, and she only viewed one page of content. She did participate in the interviews, and she said she never logged

into Slack or used it. Based on the data, Jenn was the only FA who fully engaged with both digital spaces of the OCoP and consumed the shared content. Jenn also attended a synchronous professional learning session providing digital pedagogy strategies for peer reviews and peer critiques sessions in virtual learning environments. The other FAs who are part of the lesson analyses group do not attend either of the two synchronous sessions presented as part of the OCoP during the semester.

Considering the results, then, attributing growth to active use of the OCoP may be a reasonable, albeit tentative conclusion. Reviewing Jenn's scores from the lesson analyses reveal she increases her pedagogical technology integration and related self-efficacy. The area in which she does not experience improvements is that of technology skills. Surveying the content focus in the OCoP potentially explains why Jenn may not have exhibited a change in her technological skills, which includes her use of the LMS, creating professional digital content such as slide decks and videos, and integrating technology applications masterfully in her teaching sessions, and shared resources. The OCoP does not include specific learning opportunities for this type of development. Instead, digital pedagogy experiences dominate the content. As noted earlier, Peeraer and Petegem (2012) identify facilitated and sustained OCoPs are a "best hope" (p. 1052) for professional learning experiences meant to expand teacher educators' knowledge and abilities. Jenn's active participation in the OCoP and evident gains from it support this notion.

Limitations and Approaches to Building Validity and Trustworthiness

I am aware of and take into account several potential threats to validity, which are possible issues that can compromise data collection, data analysis, and the conclusions researchers make about data (Ivankova, 2015). Additionally, I am aware of and recognize potential limitations that could affect the study. To mitigate these

threats and limitations, and to increase validity and trustworthiness, I identify the concerns and efforts to address them.

As a threat to validity, history can invalidate a study if an event occurs during the time of the study that influences the dependent variable but is not associated with the independent variable (Smith & Glass, 1987). This might occur in my study when measuring instructors' self-perceptions of their technology integration skills due to the use of the online community of practice (OCoP) during the semester, if they participate in learning experiences beyond the online community of practice. Their perceived growth could be from the external professional learning rather than being influenced by the OCoP. This was a potential limitation in my study because instructors may engage with learning options on their own or at the university-level. Due to the switch to remote instruction, some FAs, particularly those who had been with the college before fall 2020, received training during the summer if they chose to participate. In fact, I presented many of the trainings as part of a college team working to prepare instructors for remote instruction. However, these trainings are not part of the OCoP. The university and outside units also offered trainings due to the need related to the transition. For example, an FA I interviewed says she received training from her primary employer, which is a K-12 school district. Another FA mentions she has access to presentations from her primary employer as well, which is also a K-12 school district. I recognize that some FAs who participated in the study could have knowledge and experience gains from those opportunities, and their improvements related to technology integration could be based on their new understandings of technology and technology use that come from those sessions and resources.

Maturation occurs when participants grow or develop internally, which might affect changes in their responses and thus the dependent variables (Smith & Glass,

1987). This might occur in my study when I was measuring self-efficacy related to teaching with technology. If participants learn new strategies and gain confidence through their teaching experiences rather than their participation in the OCoP, maturation might be an alternative way to explain the increases in scores. To maximize validity, I include questions in the survey and interview about instructors' perceived growth and influences that could lead to their growth. Some FAs indicate they improve their technology integration knowledge and skills as they are teaching during the semester. They learn some elements, especially functional technology skills, through trial and error and research outside of the OCoP. Therefore, some improvements in self-efficacy could be attributed to maturation. Likewise, other increases in the data might occur because of maturation as well.

The experimenter effect can occur when a researcher exhibits such enthusiasm that participants want to perform at high levels to please the researcher; therefore, they perform beyond levels that might be attained with another researcher in charge (Smith & Glass, 1987). Another possibility of the experimenter effect occurs when an experimenter provides an extended level of support or encouragement to participants, which affects how participants perform (Smith & Glass, 1987). This could occur in my study due to my relationships with my participants. Instructors with whom I have worked prior may feel they 'owe me' to participate or may want to achieve at a higher level to please me. I maximize validity by limiting my interactions with the participants. Because my focus is on part-time faculty who are usually new, I likely have less influence on them. Using the retrospective pre-test method was also a strategy to limit this matter. Although I did take steps to alleviate experimenter effect, I recognize this was a limitation, especially because I provide training and support for the entire college in preparation for and facilitation of remote teaching during the fall semester. I was more visible

than I would normally have been. Trainings presented by me and curated content I developed were included in the communications available to faculty in support of remote instruction. If FAs felt they knew me well, recognized my name, or participated in my summer trainings, they may share data responses influenced by the experimenter effect. Additionally, using the retrospective, pre-intervention and post-intervention surveys to gather participants' self-reported data is another method to alleviate the experimenter effect (Lam a& Bengo, 2003),

Finally, a limitation is the potential effect of the shift to remote teaching that was concurrent with the study. In response to the COVID-19 pandemic, instructional delivery for faculty members moved into digital spaces and was completely remote or virtual or partially remote. Therefore, instructors faced increased requirements for integrating technology into their instruction. This could have contributed to their use of the OCoP by elevating their use due to the heightened need. Instructors had the opportunity to participate in numerous preparation sessions in the weeks before the start of the semester. That could have also changed how FAs may have participated in the OCoP. They had more training and learning opportunities related to digital pedagogy during that time period than in an otherwise standard start of a fall semester. This may have contributed to less use of the OCoP. Another related element was the implementation of Zoom and Slack at greater levels in the college. FAs were more apt to use Zoom and digital technologies like Slack because the college was promoting both. The university also offered much more training and learning for instructors using technology due to this change in learning environments. All of these factors may have influenced how FAs engaged with the OCoP and should be considered when determining the effectiveness of the OCoP and its influence on FAs' instructional practices with technology and related development.

A step toward enhancing trustworthiness and mitigation of limitations is the use of the various data sources. In the study, I use multiple data sources, which helps in addressing validity and trustworthiness (Creswell & Creswell, 2018; Ivankova, 2015; Maxwell, 2013). Using surveys, interviews, Slack analytics, Canvas analytics, and observations of instructors' teaching materials with interpretative notes allows me to determine whether these data display similar results, which is a method of increasing validity. This triangulation process allows me to find common themes that substantiate each other, hence improving validity (Creswell & Creswell, 2018). I recognize the application of the lesson analysis protocol includes a subjective element. However, developing the protocol based on research (ISTE, 2017; Kolb, 2017; Schmidt et al., 2009) and analyzing my interpretive notes is evidence of working toward improving validity and credibility of the study. The constant comparative method and writing memos increases validity of qualitative interview data and results in definitive themes (Charmaz, 2014; Glaser & Strauss, 1967). By accounting for and attending to potential threats to validity, I make my best effort to alleviate these threats. A researcher cannot eliminate all threats. Realizing that, I know that I reduce threats and address these potential effects when considering and reporting the limitations and results of my study.

Implications for Practice

An online community of practice is a potentially effective method of delivering professional learning, connecting instructors, sharing resources, and engaging faculty members. Results of the study indicate FAs who participate benefit and perceive they learned and strengthened technology integration abilities due to the experiences. However, the number of FAs who are engaged in the OCoP, attend live learning sessions, use professional learning resources, and spend productive time in the digital spaces is only a fraction of the total number of FAs. In this study, about 33%

of FAs are users of the OCoP, and their engagement levels vary a great deal. Considering nearly 38% of the fall 2020 semester's courses are taught by FAs, that engagement level does not ensure part-time faculty are capably delivering effective technology-infused instruction to teacher candidates (TCs) in the college.

Due to their part-time status, most FAs are lurkers and passive consumers in the OCoP. Interview responses indicate that is due to a lack of self-efficacy or a perception that they have limited or unimportant knowledge to share with the community. Efforts to bolster FAs' contributions would benefit all. Including them in more conversations about instruction and professional learning might encourage them to use the space more and add their ideas to it. A possible method for this could be inviting FAs to present short learning sessions or record videos describing teaching strategies through the OCoP. Thereafter, their contributions could become part of the curated resources in the space. This could affect their self-efficacy and perceptions that they have worthy knowledge to share. Building connections and community among all members could lead to more activity and use.

For a medium such as this to achieve full capacity and have the desired outcome of supporting part-time faculty members, other changes are necessary. First, promotion of the OCoP must be more widespread and frequent. I serve as the main proponent of the OCoP even though the faculty professional development team knew it was the primary connection and communication source for FAs. On a very limited basis, those team members encourage its use. Beyond their introduction of the OCoP during FA orientation at the start of the semester, I observe that only two members of that team engage in the OCoP. That presence is during the first week of the semester. Moreover, I expect they do not continue to direct FAs to the space. Other faculty members and college leadership also do not actively promote its use to

FAs. Without that promotion and direction, FAs are more apt to avoid it or use it on a limited basis.

Second, FAs should have pathways for learning and connection to all colleagues in teacher preparation programs. The current membership of the OCoP includes FAs and the faculty development team members. With a small number (five) of full-time faculty members included in the OCoP, FAs' networking and learning options are limited. Likewise, those five faculty members could not be responsible for facilitating the OCoP. A better structure would place all teacher preparation faculty, regardless of status, in the OCoP. With a completed adoption by college leadership, all FAs and full-time faculty members would have incentive to engage in networking and resource-sharing in the OCoP.

Third, if college leadership supports an organized effort to encourage and promote participation, engagement levels in the OCoP may increase. FAs are already less involved and less aware due to their part-time status and other obligations such as full-time employment elsewhere. For that reason, they may forget about the OCoP if they are only introduced to it at the beginning of their teaching terms. Specific outreach strategies, reminders, and other communication methods could consistently lead them to the OCoP as a place for help and learning options. Moreover, it is likely more instructors will use the digital spaces if the OCoP is a centralized location that includes all necessary resources and information. During the time of this study, the OCoP was just 'another' place for FAs to visit along with their email, the teacher preparation website, and content-specific online shared spaces. For more effective and continued use, the OCoP should have all instructional content and connections available there for centralized and quick access. By promoting a clear pathway to the OCoP for digital pedagogy and technology integration learning, instructors will have less need to take separate paths to try to achieve similar outcomes.

Finally, content changes may also improve use of the OCoP and benefit participants. Based on the study's findings, the FA who used the OCoP the most did not have gains with respect to her technology fluency due to a lack of specific learning options for functional technology skill development in the space. An aim of the OCoP should be to assist FAs with their growth in technology fluency or technology literacy as well as digital pedagogy. Therefore, more learning opportunities for that purpose will need to appear in future iterations of the OCoP. Surveying members about their needs would also influence available resources and learning opportunities. During the study, I would send announcements in Canvas and post questions in Slack asking what FAs needed with respect to integrating technology into instruction, but I did not have any responses. A more structured survey, sent by college leadership or course coordinators to all members of the OCoP, would direct FAs to content in the OCoP, which could affect the levels of engagement.

Implications for Future Research

Because the findings indicate FAs who are active in the OCoP demonstrate gains in their technology-related knowledge, skills, and pedagogical use, future studies should expand upon that to better describe use. For example, case studies have the potential to explain the influence of the various experiences in the OCoP. Developing profiles of FAs who are active in the spaces to discover how they engage with the content, when they participate, and why could assist in improvements to the OCoP as well as methods for encouraging FAs to spend more time in the OCoP. Investigating cases of various levels of use would also be revealing. Research questions could include "What motivates you to engage with the OCoP?" and "What are specific improvements in your technology integration methods that are attributable to your participation in the OCoP?"

With the understanding that the OCoP is effective as a professional network for FAs, next steps should lead to further developing the OCoP to ensure it provides appropriate, needed resources. Research could include surveys of instructors to identify which parts of the OCoP are beneficial and which are not necessary. Surveying at time intervals in longitudinal studies would ensure the OCoP is relevant and current for FAs and provide for assessing their changing needs and expectations. Investigating FAs' perceptions on a regular basis could lead to constructing refinements and produce a more targeted experience for FAs. A research question might be "Which elements in the OCoP have influenced your instruction the most?"

Another area of research also builds upon the understanding that the OCoP is effective despite the fact that not all FAs use it. Further, those who are active rarely share their ideas and knowledge. A future study aiming at understanding motivation for participation and investigating various levels of participation would assist in incentivizing use and encouraging contributions from FAs. Thus, the study would investigate possible methods for encouraging participation such as badging, certification opportunities, or micro credentials. A possible research question is "How and to what extent does digital badging motivate part-time faculty to participate in an online community of practice?"

Finally, investigating benefits beyond those related to professional development is another implication for future research. Literature about part-time faculty indicates they often feel isolated, have less respect than their full-time counterparts, and perceive they do not have access to professional development opportunities to improve their practice (Dolan, 2011; Hadar & Brody, 2010; Webb et al., 2013). A study focusing on these elements would describe the full scope of influence of the OCoP for FAs. Potential research questions include "How has participation in the OCoP affected your perceptions of your professional status" and

"How and to what extent did the OCoP influence your perception of belonging to the college?"

Personal Lessons Learned

As I reflect on this study, I recognized the possibility for change through research, specifically action research. When I began to investigate my problem of practice and develop my research questions years ago, I had only a minimal understanding of how powerful action research can be. I am proud to declare that my intervention has evolved into an online community that has expanded to include all faculty members, not just FAs. Just after I concluded my final research cycle, I collaborated with members of college leadership to modify the Canvas shell and Slack workspace to create what is now the MLFTC Teaching Community for all faculty members of our teacher preparation programs. My hope of building a space for FAs has led to a rewarding accomplishment beyond my imagination. My scholarly leadership has led to this organizational change that has the potential to improve instructors' teaching and students' learning experiences.

My understanding of research, specifically mixed methods and action research, resulted in the development of the OCoP and its recent endorsement and expansion. Because I designed a study that included both quantitative and qualitative data and included numerous data collection sources, I was able to create a successful intervention and study its influence. Having corroborating data from various sources, and rich data at that, indicates complementarity and adds to the validity of this study. Now that I am able to conduct studies such as this, develop sound research questions, identify quantitative and qualitative data sources, and analyze the data, I will continue to function as a scholarly practitioner in all aspects of my work. Knowing this strengthens my contributions to the organization and confidence levels.

As we create change and interventions to solve problems within our work settings, we usually do not study them. Therefore, the preparations for change are limited and the implementation may also be limited. Do these proposed solutions fail due to limited research and planning? Would my idea of an online community of practice have folded before it even got started if I had not proceeded as a researcher? I suspect that would have been the outcome. How much wasted time and effort goes into initiatives that are not based in research? Reflecting on the various projects and initiatives I have been involved in during my professional career, I have to wonder how different some outcomes would have been had I been a scholarly practitioner then. Not being able to go back to adjust any of those experiences, I am replete with the confidence that now I can approach actions such as these from the perspective of a scholarly practitioner. Viewing organizational changes with this knowledge and depth of experience will contribute to the effectiveness of the innovations ahead. In my new role, I am developing the IgnitED Labs and creating plans to facilitate its functions, expand them, and earn revenue for the college. As a scholarly leader, I am prepared for the challenges related to these goals. I am a researcher who will approach this and future projects with professional knowledge and skills attained through their application to my practice in this study. As it turns out, action research is, indeed, powerful.

Conclusion

I envisioned a digital space for FAs to gain support, learn, and feel connected so they would be able to deliver exemplary course experiences infused with technology. At the core of my vision was the concern that our TCs need consistent and effective instruction that includes seamless technology integration. I knew that was not the case at the time. I still cannot claim the OCoP and its professional learning opportunities guarantee all TCs are engaged with the learning experiences

called for; however, the likelihood of that is far greater with the OCoP in place. With college leadership in the teacher preparation division adopting the OCoP and advancing it as a space for all faculty members, I know more instructors will have access to professional development content and resources. Further, they will have connections to colleagues.

Also important to me is being able to engage faculty members and provide professional learning opportunities for them within the boundaries of this work. Previously, my time was limited for delivering learning sessions, and I did not have a central communication method for sharing resources and providing support. That is no longer an issue. The MLFTC Teaching Community includes both a resource repository in Canvas and a networking component in Slack. I frequently answer questions in Slack and add Canvas content on a regular basis. Although I do not have scheduled times to present in person, the alternative is much better. I am able to present virtually and record sessions so TEs can view and learn at their convenience. If they have follow-up questions or needs after attending a session or viewing a recording, they can send me a Slack message and receive a quick response. If they ask their questions in the shared Slack channel, then other faculty members can see the content there as well. To a large degree, I resolved my problem of practice. My intervention, the OCoP, is the digital community I was hoping it could be.

MLFTC Teaching Community exists as it does now due to the modifications based on my cycles of research, the findings of this study, and its adoption by college leadership. The influence of the OCoP is still a work in progress and the full extent of its effect is yet to be determined. In its current state, it includes all faculty members who make up Division 1, Teacher Preparation, of the college, which is a total of 266. The college has another division, Division 2, which includes faculty

members who teach in graduate level programs. Adding Division 2 members to the OCoP is a possibility for further expansion. If that addition occurs, the MLFTC Teaching Community will effectively serve and connect all instructors in the college. Perhaps with continuing examination through research studies, that could be a key development and the OCoP will expand once again.

Regardless of the transformations ahead, this study, the OCoP intervention, and related findings bring us closer to providing our teacher candidates with the foundations necessary as they address the challenges of teaching in a 'present' that does not stand still. As Dewey (1956) noted, the child's "universe is fluid and fluent; its contents dissolve and re-form with amazing rapidity" (p. 6). Within that learning universe exists transitioning media and modalities. Teachers must be able to flexibly adapt to those changes, many emerging from technological advancements. Providing teacher educators with coordinated methods for their own education and growth assists in their abilities to transfer that to their students—future teachers who will daily be guiding young students through knowledge development in their own universes.

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APPENDIX A

POST-INTERVENTION SURVEY

Q1 **Post-Intervention Survey Fall 2019**

Q2 When you respond to the Likert items later in the survey instrument, please think about yourself as you are **now**, following your participation in the online community of practice.

Q3 **Section 1**

Q4 Unique identifier, known only to you, (use the first three letters of your mother's first name and the last four digits of your phone number. For example, Sar4567 would be the identifier if your mom's first name was Sarah and your phone number is (623) 555-4567. This will allow us to connect responses from the two surveys while keeping data anonymous:

_____

Q5 Gender identity

- o Male (1)
- o Female (2)
- o Non-binary (3)
- o Prefer not to answer (4)

Q6 Status within Mary Lou Fulton Teachers College

- o Full-time (1)
- o Part-time (2)

Q7 Years teaching in Mary Lou Fulton Teachers College

_____

Q8 Courses teaching this term in Mary Lou Fulton Teachers College

Page Break

Q9 **Section 2**

When you respond to these items, please think about yourself as you are **now**, following your participation in the online community of practice and answer each item.

Q10 Following my participation in the online community of practice, I combine technology, pedagogy, and content knowledge in my teaching.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q11 Following my participation in the online community of practice, when planning instruction, I consider integrating technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q12 Following my participation in the online community of practice, when teaching, I align pedagogical practices and content delivery with appropriate technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q13 Following my participation in the online community of practice, when planning instruction, I apply the knowledge of my context and my students' contexts as I consider using technology during instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q14 Following my participation in the online community of practice, when teaching, my context, and the contexts of my students, influence the technology I choose to integrate.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)

(1)	o	o	o	o	o	o

Q15 Following my participation in the online community of practice, I have the technology skills needed to integrate technology into my course instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q16 Following my participation in the online community of practice, I readily blend my pedagogy skills with technology to conduct instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q17 Following my participation in the online community of practice, I easily blend technology skills with course content as I conduct instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)

(1)	o	o	o	o	o	o

Page Break

Q18 **Section 3**

When you respond to these items, please think about yourself as you are **now**, following your participation in the online community of practice and answer each item.

Q19 Following my participation in the online community of practice, when teaching, I model approaches for aligning the content being taught with appropriate pedagogy and technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q20 Following my participation in the online community of practice, I assist teacher candidates with evaluating content-specific technologies that support student learning (e.g. data analysis applications for science, reading instruction applications for English language arts, simulation applications for social studies and mathematics).

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q21 Following my participation in the online community of practice, I provide opportunities for teacher candidates to practice teaching with technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q22 Following my participation in the online community of practice, I provide opportunities for teacher candidates to reflect on their attitudes about using technology for teaching.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)

(1)	o	o	o	o	o	o

Q23 Following my participation in the online community of practice, I model the use of technology to differentiate learning during my instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q24 Following my participation in the online community of practice, I model assessment practices that use technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q25 Following my participation in the online community of practice, I share a vision with teacher candidates for teaching with technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q26 **Section 4**

When you respond to these items, please think about yourself as you are **now**, following your participation in the online community of practice and answer each item.

Q27 Following my participation in the online community of practice, I feel confident I can select technology tools to use for teaching.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q28 Following my participation in the online community of practice, I can teach with technology tools.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q29 Following my participation in the online community of practice, I am certain that I can model technology for my students.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)

(1)	o	o	o	o	o	o

Q30 Following my participation in the online community of practice, I feel confident that I can meet course outcomes through the use of technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q31 Following my participation in the online community of practice, I can integrate new technologies into my teaching.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q32 Following my participation in the online community of practice, I am certain that I can prepare my students to teach with technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)

(1)	o	o	o	o	o	o

Page Break

Q33 **Section 5: Online Community of Practice Participation**

Q34 How much time did you spend in the online community of practice each week?

_____

Q35 How many pages did you view each week?

_____

Q36 What did you contribute to the online community of practice?

_____

Q37 What did you learn from the online community of practice?

_____

Q38 Thank you for participating in this research study. If you have any questions, please contact the researcher, Jodie Donner at jodie.donner@asu.edu, or her dissertation chair Dr. Ray Buss at ray.buss@asu.edu.

End of Block: Default Question Block

APPENDIX B

RETROSPECTIVE PRE-INTERVENTION SURVEY

Q1 **Retrospective, Pre-Intervention Survey Fall 2019**

Q2 When you respond to the Likert items later in the survey instrument, please think about yourself as an instructor **prior** to your participation in the online community of practice.

Q3 **Section 1**

Q4 Unique identifier, known only to you, (use the first three letters of your mother's first name and the last four digits of your phone number. For example, Sar4567 would be the identifier if your mom's first name was Sarah and your phone number is (623) 555-4567). This will allow us to connect responses from the two surveys while keeping data anonymous:

_____

Q5 Gender identity

- o Male (1)
- o Female (2)
- o Non-binary (3)
- o Prefer not to answer (4)

Q6 Status within Mary Lou Fulton Teachers College

- o Full-time (1)
- o Part-time (2)

Q7 Years teaching in Mary Lou Fulton Teachers College

_____

Q8 Courses teaching this term in Mary Lou Fulton Teachers College

Q9 Section 2

When you respond to these items, please think about yourself as an instructor **prior** to your participation in the online community of practice and answer each item.

Page Break

Q10 Prior to participating in the online community of practice, I combined technology, pedagogy, and content knowledge in my teaching.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q11 Prior to participating in the online community of practice, when planning instruction, I considered integrating technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q12 Prior to participating in the online community of practice, when teaching, I aligned pedagogical practices and content delivery with appropriate technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q13 Prior to participating in the online community of practice, when planning instruction, I applied the knowledge of my context and my students' contexts as I considered using technology during instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q14 Prior to participating in the online community of practice, when teaching, my context, and the contexts of my students, influenced the technology I choose to integrate.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q15 Prior to participating in the online community of practice, I had the technology skills needed to integrate technology into my course instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q16 Prior to participating in the online community of practice, I readily blended my pedagogy skills with technology to conduct instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q17 Prior to participating in the online community of practice, I easily blended technology skills with course content as I conduct instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Page Break

Q18 **Section 3**

When you respond to these items, please think about yourself as an instructor **prior** to your participation in the online community of practice and answer each item.

Q19 Prior to participating in the online community of practice, when teaching, I modeled approaches for aligning the content being taught with appropriate pedagogy and technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q20 Prior to participating in the online community of practice, I assisted teacher candidates with evaluating content-specific technologies that support student learning (e.g. data analysis applications for science, reading instruction applications for English language arts, simulation applications for social studies and mathematics).

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)

(1)	o	o	o	o	o	o

Q21 Prior to participating in the online community of practice, I provided opportunities for teacher candidates to practice teaching with technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q22 Prior to participating in the online community of practice, I provided opportunities for teacher candidates to reflect on their attitudes about using technology for teaching.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q23 Prior to participating in the online community of practice, I modeled the use of technology to differentiate learning during my instruction.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q24 Prior to participating in the online community of practice, I modeled assessment practices that used technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)
(1)	o	o	o	o	o	o

Q25 Prior to participating in the online community of practice, I shared a vision with teacher candidates for teaching with technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Page Break

Q26 **Section 4**

When you respond to these items, please think about yourself as an instructor **prior** to your participation in the online community of practice and answer each item.

Q27 Prior to participating in the online community of practice, I felt confident I could select technology tools to use for teaching.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q28 Prior to participating in the online community of practice, I could teach with technology tools.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q29 Prior to participating in the online community of practice, I was certain that I could model technology for my students.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q30 Prior to participating in the online community of practice, I felt confident that I could meet course outcomes through the use of technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q31 Prior to participating in the online community of practice, I could integrate new technologies into my teaching.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Q32 Prior to participating in the online community of practice, I was certain that I could prepare my students to teach with technology.

	Strongly Agree (6)	Agree (5)	Slightly Agree (4)	Slightly Disagree (3)	Disagree (2)	Strongly Disagree (1)
(1)	o	o	o	o	o	o

Page Break

Q33 Thank you for participating in this research study. If you have any questions, please contact the researcher, Jodie Donner at jodie.donner@asu.edu, or her dissertation chair Dr. Ray Buss at ray.buss@asu.edu.

End of Block: Default Question Block

APPENDIX C

FALL 2020 CYCLE 3 INTERVIEW PROTOCOL

1. How did you use technology in your teaching?
2. How did students use technology? Please provide some examples.
3. Which resources in the online community of practice were relevant to your use of technology in your teaching?
4. Which resources, if any, did you incorporate into your teaching practices?
5. If you found an element of the online community of practice useful, what was it and why was it useful?
6. How did components of the online community of practice influence your use of technology in your teaching?
7. What are your perceptions of the effectiveness of the technology integration foundations module (focused on TPACK and Triple E) included in the online community of practice?
8. How did you contribute to the online community of practice?
9. If you did not contribute, why didn't you?
10. How did you benefit from others' contributions in the online community of practice?
11. How did you connect with other instructors through the online community of practice?
12. If you recognize changes in your skills, knowledge, or capabilities of teaching with technology, please explain if your participation in the online community of practice influenced any of the changes.
13. What questions do you have of me?

APPENDIX D

RESEARCH LESSON ANALYSIS PROTOCOL

Items in this protocol, when observable in lesson content in the learning management system, represent the instructors' knowledge of technology, technology skills, pedagogical technology use, and self-efficacy.

Criteria	0-No	1-Somewhat	2-Yes
Pedagogical use Instructor plans the use of at least one technology during instruction.			
Skills Instructor's lesson structure in the learning management system is evidence of a solid understanding of the capabilities of the LMS.			
Skills Instructor integrates technology tools in content development in the LMS.			
Pedagogical use Planned student technology use focuses students on learning goals rather than distraction.			
Pedagogical use Planned student technology use provides active, social learning opportunities.			
Pedagogical use Planned student technology use scaffolds learning through personalization and/or differentiation.			
Self-efficacy Modeling of technology for learning is evident in the lesson content.			
Pedagogical use The instructor has clearly included opportunities for students to understand connections between technology use in their learning and teaching.			
Self-efficacy Integration of technology is purposeful.			
Pedagogical use Technology adds diverse paths for students to demonstrate learning.			
Self-efficacy A learning culture of digital fluency is evident.			
Pedagogical use			

Technology elements contribute to authentic learning activities.			
Pedagogical use Technology use by students and instructor aligns with learning objectives.			
Pedagogical Use Integrated digital tools support course content.			

Observational Notes about Lesson:

Pedagogical Technology Use Possible Total: 18
Technology Skills Possible Total: 4
Self-efficacy Possible Total: 6

APPENDIX E

IRB-APPROVED STUDY DOCUMENTS

ASU Knowledge Enterprise Development

EXEMPTION
GRANTED

Ray Buss
Division of Educational Leadership and Innovation - West Campus
602/543-6343
RAY.BUSS@asu.eduDear Ray Buss:
On 8/6/2020 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	An Online Community of Practice for Teaching with Technology: Support for Part-Time Teacher EducatorsPreparing Preservice Teachers for Tomorrow's Classrooms
Investigator:	Ray Buss
IRB ID:	STUDY00012284
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Interview Questions, Category: Measures (Survey questions/Interview questions /interview guides/focusgroup questions); • IRB Protocol, Category: IRB Protocol; • Lesson Analysis Protocol, Category: Measures (Survey questions/Interview questions /interviewguides/focus group questions); • Recruitment Consent Letter, Category: RecruitmentMaterials; • Survey, Post-intervention, Category: Measures (Survey questions/Interview questions /interviewguides/focus group questions); • Survey, Retrospective, Pre-intervention, Category:Measures (Survey questions/Interview questions /interview guides/focus group questions);

The IRB determined that the protocol is considered exempt pursuant to FederalRegulations 45CFR46 on 8/6/2020.

In conducting this protocol you are required to follow the requirements listed in theINVESTIGATOR MANUAL (HRP-103).

If any changes are made to the study, the IRB must be notified at research.integrity@asu.edu to determine if additional reviews/approvals are required.Changes may include but not limited to revisions to data collection, survey and/or interview questions, and vulnerable populations, etc.

Sincerely,

IRB Administratorcc:
Jodie Donner

Instructions and Notes:

- Depending on the nature of what you are doing, some sections may not be applicable to yourresearch. If so, mark as "NA".
- When you write a protocol, keep an electronic copy. You will need a copy if it is necessary tomake changes.

1 Protocol Title

Include the full protocol title: An Online Community of Practice for Teaching with Technology:Support for Part-Time Teacher Educators Preparing Preservice Teachers for Tomorrow's Classrooms

2 Background and Objectives

Provide the scientific or scholarly background for, rationale for, and significance of theresearch based on the existing literature and how will it add to existing knowledge.

- Describe the purpose of the study.
- Describe any relevant preliminary data or case studies.
- Describe any past studies that are in conjunction to this study.

The purpose of the study is to examine the effectiveness of an online community of practice as asource of professional learning, connection, and networking for part-time faculty members who teach with technology in Mary Lou Fulton Teachers College. This study builds upon earlier work focused on developing digital spaces that include resources to support part-time instructors (STUDY00010850).

3 Data Use

Describe how the data will be used.

Examples include:

- Dissertation, Thesis, schoolUndergraduate honors project
- Publication/journal article, conferences/presentations
- Results released to agency ororganization
- Results released to participants/parents
- Results released to employer or
- Other (describe)

The data will be used in a dissertation and in publications and conference presentations. Results may be released to the organization and participants, as appropriate.

4 Inclusion and Exclusion Criteria

Describe the criteria that define who will be included or excluded in your final study sample. Ifyou are conducting data analysis only describe what is included in the dataset you propose touse. Indicate specifically whether you will target or exclude each of the following specialpopulations:

- Minors (individuals who are under the age of 18)
- Adults who are unable to consent
- Pregnant women
- Prisoners
- Native Americans
- Undocumented individuals

Minors will not be included. Adults who cannot consent, prisoners, and undocumented individualswill not be included. Pregnant women and Native Americans are not excluded but also are not specifically recruited for the study.

5 Number of Participants

Indicate the total number of participants to be recruited and enrolled*:*

The number of participants to be recruited will be 155 (all faculty associates in the Mary Lou Fulton Teachers College) and the number enrolled will depend on their volunteering.

6 Recruitment Methods

- Describe who will be doing the recruitment of participants.
- Describe when, where, and how potential participants will be identified and recruited.
- Describe and attach materials that will be used to recruit participants (attachdocuments or recruitment script with the application).

The Co-PI will recruit participants through a virtual orientation session using Zoom, which will be held prior to the start of the fall semester. The Co-PI will prepare a video that introduces participants to the intervention and provides an overview of the research. Potential participants will view the video during the orientation. As part of adjunct faculty members' employment with the college, they receive membership in the online community of practice, which will be in both Slack and Canvas. After enrollment in the digital spaces and introduction to the online communityof practice, potential participants will receive communication shared by the Co-PI in Canvas and Slack. The Co-PI will share a digital recruitment and consent letter with potential participants through that communication and invite them to participate. A copy of the recruitment and consentletter is attached to this application.

7 Procedures Involved

Describe all research procedures being performed, who will facilitate the procedures, andwhen they will be performed. Describe procedures including:

- The duration of time participants will spend in each research activity.
- The period or span of time for the collection of data, and any long term follow up.
- Surveys or questionnaires that will be administered (Attach all surveys, interview questions, scripts, data collection forms, and instructions for participants to the onlineapplication).
- Interventions and sessions (Attach supplemental materials to the online application).
- Lab procedures and tests and related instructions to participants.
- Video or audio recordings of participants.
- Previously collected data sets that that will be analyzed and identify the data source(Attach data use agreement(s) to the online application).

Intervention. A facilitated, online community of practice in Canvas and Slack is serving as the intervention. The space includes networking opportunities, resources for instruction, resources for teaching with technology, optional 5-10 minute virtual professional learning sessions through video-conferencing, and learning modules related to teaching with technology. The intervention includes all part-time faculty members, but the focus is for instructors who infuse technology into their teaching and/or teaching courses deemed by the college to be technology-infused.
Instructors of any kind may participate in the study. Participants will be in the online community ofpractice for one term of 15 weeks.

Survey. The Co-PI will digitally distribute two surveys. Both instruments are attached. The first isa post-intervention survey, which participants will respond to in week 13 of the semester. In week 14, participants will respond to the retrospective pre-intervention survey. See attacheddocuments.

Interview Questions. The Co-PI will use purposive sampling to identify eight instructors to interview in week 14 of the semester. The interview will take no longer than 20 minutes and willbe audio recorded following the consent of the participants. See attached document.

Analytics from the Learning Management System (LMS). The Co-PI will export analytics from the Canvas and Slack systems that depict instructors' use of the intervention. With participants' permission, the Co-PI will analyze the data to determine descriptive statistics. The Co-PI will NOT match the analytics data to participants, and the data will be de-identified.

Lesson Analysis Protocol. The Co-PI will use purposive sampling to identify four instructors who agree to lesson analysis by the Co-PI. Identification of these instructors will occur in the firstweek of the term. The Co-PI will use a lesson analysis protocol focused on technology use to analyze instructional course content in the Canvas Learning Management System shared by theparticipants. The Co-PI will analyze five total lessons from each of the four instructors. Lessons will represent five time intervals of the term: weeks 1-3, weeks 4-6, weeks 7-9, weeks 10-12, weeks 13-15. See attached document.

8 Compensation or Credit

- **Describe the amount and timing of any compensation or credit toparticipants.**
- **Identify the source of the funds to compensate participants**
- **Justify that the amount given to participants is reasonable.**
- **If participants are receiving course credit for participating in research, alternative assignments need to be put in place to avoidcoercion.**

Participants will receive no compensation nor credit for participating in the study.

9 Risk to Participants

List the reasonably foreseeable risks, discomforts, or inconveniences related to participationin the research. Consider physical, psychological, social, legal, and economic risks.

No foreseeable risks, discomforts, or inconveniences for participants exist related to the study.

10 Potential Benefits to Participants

Realistically describe the potential benefits that individual participants may experience from taking part in the research. Indicate if there is no direct benefit. Do **not** include benefits to society or others.

Participants may potentially benefit by having access to extra resources and support related to instruction. Additionally, reflecting on the experience may be beneficial for them.

11 Privacy and Confidentiality

Describe the steps that will be taken to protect subjects' privacy interests. "Privacy interest" refers to a person's desire to place limits on with whom they interact or to whom they providepersonal information. Click here for additional guidance on ASU Data Storage Guidelines.

Describe the following measures to ensure the confidentiality of data:

- Who will have access to the data?
- Where and how data will be stored (e.g. ASU secure server, ASU cloud storage,filing cabinets, etc.)?
- How long the data will be stored?
- Describe the steps that will be taken to secure the data during storage, use, andtransmission. (e.g., training, authorization of access, password protection, encryption, physical controls, certificates of confidentiality, and separation of identifiers and data, etc.).
- If applicable, how will audio or video recordings will be managed and secured. Addthe duration of time these recordings will be kept.
- If applicable, how will the consent, assent, and/or parental permission forms besecured. These forms should separate from the rest of the study data. Add the duration of time these forms will be kept.
- If applicable, describe how data will be linked or tracked (e.g. masterlist, contact list,reproducible participant ID, randomized ID, etc.).

If your study has previously collected data sets, describe who will be responsible for data securityand monitoring.

Only the PI and Co-PI will have access to the data. Data will be stored digitally using ASU cloud services, which are password-protected. Data will be stored for four years. The audio recordingsof the interviews will be deleted from the original recording device upon transcription of the audio files, which will be stored using ASU cloud services that are password-protected. Consent formswill be stored digitally and separate from the other data in ASU cloud services, which are password-protected.

For the surveys, participants will use the following process to create a unique identifier knownonly to them. They will use the first three letters of their mother's first name and the last four digits of their phone number. For example, Sar4567 would be the identifier if their mom's firstname was Sarah and their phone number is (623) 555-4567.

12 Consent Process

Describe the process and procedures process you will use to obtain consent.
Include adescription of:

- Who will be responsible for consenting participants?
- Where will the consent process take place?
- How will consent be obtained?

If participants who do not speak English will be enrolled, describe the process to ensure that the oral and/or written information provided to those participants will be inthat language. Indicate the language that will be used by those obtaining consent. Translated consent forms should be submitted after the English is approved.

The Co-PI will be responsible for obtaining consent from the participants. The Co-PI will distribute the digital consent form through Canvas and obtain consent via that method. Participants who do not speak English will not be enrolled.

13 Training

Provide the date(s) the members of the research team have completed the CITI training for human participants. This training must be taken within the last 4 years. Additional information
can be found at: Training.

Dr. Ray Buss, PI, CITI Certificate on file
Jodie Donner, Co-PI, CITI Certificate on file

Dear Colleague:

My name is Jodie Donner, and I am a doctoral candidate in the Mary Lou Fulton Teachers College (MLFTC) at Arizona State University (ASU). I am working under the direction of Dr. Ray Buss, a faculty member in MLFTC. We are conducting a research study on the professional learning and support for part-time faculty with respect to technology infusion. The purpose of this study is to identify resources and support that might assist instructors who teach part-time in the college.

We are asking for your help, which will involve your participation in an online community of practice within Canvas and Slack. You already have access to the online community in Canvas and Slack that will connect you with instructors who are teaching in the college. With your permission, I would like to include your data in my research study. This includes the following:

- Analysis of five lessons and instructional materials within Canvas. Lessons will be representative of five time period intervals in the semester: weeks 1-3, weeks 4-6, weeks 7-9, weeks 10-12, and weeks 13-15. If you are willing to share access to your instructional content, please respond accordingly in the option below. I will communicate with instructors selected for the lesson analysis.
- Analysis of all instructors' analytic data that I will export from Canvas and Slack that details instructors' use. Your signed consent is required for this part of the data. See the signature line below.
- Instructors' participation in two short surveys near the end of the semester (8-10 minutes each).
- Follow-up recorded interviews (about 20 minutes) for eight instructors willing to share experiences. If you anticipate you will be willing to share your experiences in an interview, please respond accordingly in the option below.

I will export the analytics from Canvas and Slack after the end of November and analyze the use of the online community of practice. I will follow up with eight instructors and request their participation in interviews. I anticipate the interviews to take 20 minutes total. I would like to audio record these interviews. I will not record the interview without your permission. Please let me know if you do not want me to record the interview; you also can change your mind after the interview starts. Just let me know. For those participating in the interview, I will ask for your verbal consent prior to the interview.

Your participation in this study is voluntary. If you choose not to participate or withdraw from the study at any time, there will be no penalty whatsoever. You must be 18 years of age or older to participate.

The benefit to participation is the opportunity for you to reflect on and think more about the content within technology-infused courses, the resources available for part-time instructors, and the ultimate learning experiences of teacher candidates. Data will also inform future iterations of this work and plans for improving resources for faculty. Thus, there is potential to enhance the experiences of our students and instructors. There are no foreseeable risks or discomforts to your participation.

Your responses will be confidential. For the surveys, use the following process to create a unique identifier known only to you. Use the first three letters of your mother's first name and the last four digits of your phone number. For example, Sar4567 would be the identifier if your mom's first name was Sarah and your phone

number is (623) 555-4567. Results from this study may be used in reports, presentations, or publications but your name will not be used.

If you have any questions concerning the research study, please contact the research team – Jodie Donner at jodie.donner@asu.edu or 602-543-6322 or Ray Buss at ray.buss@asu.edu or (602) 543-6343.

Thank you,

Jodie Donner, Doctoral Candidate
Ray Buss, Associate Professor

Please check the options below if you are willing to participate in the lesson analysis and interview portions of the research.

_____ I consent to the analysis of my instructional content within my Canvas course.

_____ I would like to contribute to the research by participating in an interview at the end of the semester.

By signing below, you consent to allow your analytics data to be used in this project.

Name _____ Signature _____
Date _____

If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact Ray Buss at (602) 543-6343 or the Chair of Human Subjects Institutional Review Board through the ASU Office of Research Integrity and Assurance at (480) 965-6788.