Innovations in Intern/Mentor Relationships and Conceptions of the Technological Pedagogical Content Knowledge (TPACK) Framework

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Abstract

The global COVID-19 pandemic has caused many adaptations to preservice teacher preparation, especially supporting completion of field-based internship experiences. This mixed methods research project utilized surveys to analyze the impact of virtual settings on (1) intern (n=14) and mentor teacher (n=5) experiences and relationships and (2) the use of instructional technology, specifically Technological Pedagogical Content Knowledge (TPACK). Key findings indicated (1) reversals of traditional mentor/intern relationships and (2) the role of technology as the foundation of instructional decision-making, resulting in challenges when adapting pedagogies of classroom management, assessment, and differentiation to virtual settings.

Keywords: clinical experiences, mentoring, TPACK, virtual instruction

For many preservice teachers, student teaching represents an exciting benchmark, bridging years of coursework and field experiences with the opportunity to become "real teachers" in their *own* classrooms. The internship, or student teaching, involves extended time shadowing a mentor teacher (henceforth, "mentor") in a classroom, assuming teaching responsibilities, and experiencing the realities of teaching. Often, preservice teachers anticipate the close relationships they will develop with their mentors and students as they gain valuable experience for their first teaching jobs.

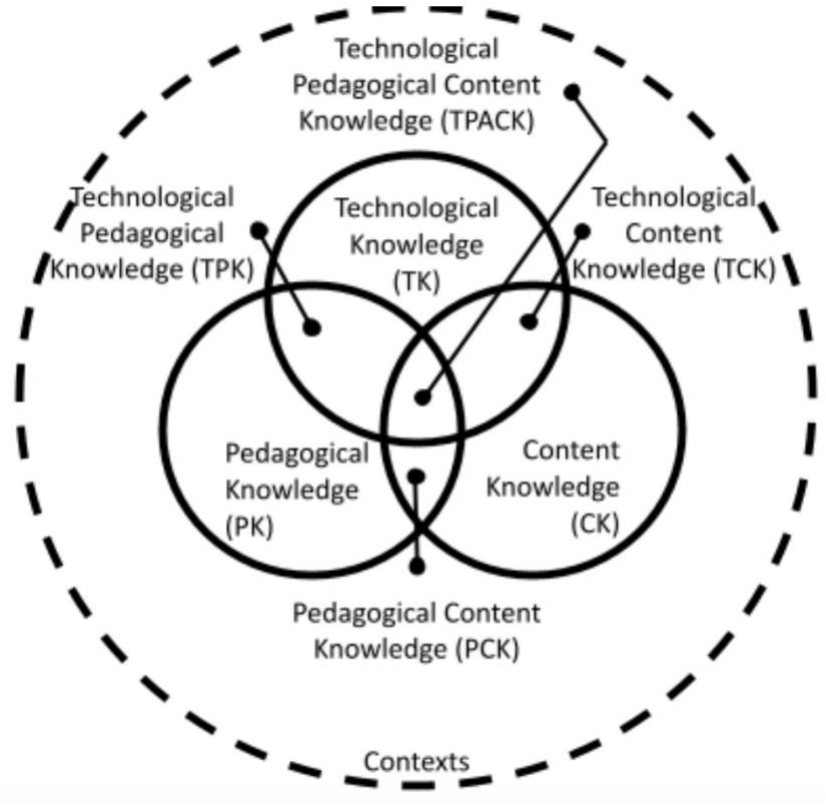
In Spring 2020, however, most of those traditional internship experiences disappeared as the COVID-19 pandemic paused in-person instruction and closed school buildings. A key component of the internship—extended time "in the field"—required innovations. As teacher educators at a teaching-focused institution in Virginia, we investigated how being in the field in Fall 2020 impacted intern and mentor experiences and interactions as well as their perceptions of instructional technology within the Technological Pedagogical Content Knowledge (TPACK) framework.

Conceptual Framework

Our conceptual framework incorporates Mishra and Koehler's (2006) TPACK framework and mentor/intern relationships. First, Mishra and Koehler's (2006) TPACK framework describes "what teachers need to know in order to appropriately incorporate technology into their teaching" (p. 1018) so that educator preparation programs (EPPs) could incorporate these skills into their programs. TPACK acknowledges that technology, pedagogy, and content knowledge all influence and limit each other, all within the context of the instructional setting (see Figure 1).

Figure 1

The TPACK Framework and Its Knowledge Components (Mishra & Koehler, 2006)



While content knowledge and pedagogy are at the foundation of instructional decision making, TPACK requires technology not be merely "added on"; instead, it should be balanced with pedagogy and content knowledge. Furthermore, TPACK incorporates the significant influence of context on the relationship among the varying knowledge components. Context may relate to varying issues of access, such as the devices and internet services available, or even which tools are allowed or blocked. Koehler, Mishra, and Cain (2013) highlight that context, while significant, is often overlooked, often resulting in a "one-size-fits-all approach to technology integration" (p. 14). When considering the intersection of pedagogy, content knowledge, and technology, therefore, individual contexts must be considered. Table 1 details all

seven domains within the TPACK framework, including acronyms that will be referenced throughout the article.

Table 1

Overview of TPACK Domains (Koehler, Mishra, & Cain, 2013)

Domain Name	Key Characteristics
Pedagogical Knowledge (PK)	"Teachers' knowledge about the subject matter to be learned or taught" (p. 14)
Content Knowledge (CK)	"Teachers' deep knowledge about the process and practices or methods of teaching and learning" (p. 15)
Pedagogical Content Knowledge (PCK)	"Knowledge of pedagogy that is applicable to teaching specific content" (p. 15)
Technological Knowledge (TK)	"Certain ways of thinking about, and working with, technology"; always in flux (p. 15)
Technological Content Knowledge (TCK)	"Understanding of the manner in which technology and content influence and constrain one another" (p. 16)
Technological Pedagogical Knowledge (TPK)	"Understanding of how teaching and learning can change when particular technologies are used in particular ways" (p. 16)
Technological Pedagogical Content Knowledge (TPACK)	"Understanding that emerges from interactions among content, pedagogy, and technology knowledge"; "the basis of effective teaching with technology" (p. 16)

The second aspect of our conceptual framework involves mentor/intern relationships. Mentors' pre-existing role expectations include the mentor as gatekeeper (Davis & Fantozzi, 2016); instructional coach or academic supporter; emotional or psychological supporter; and socializing agent (Butler & Cuenca, 2012; Koc, 2012). From the interns' perspective, their relationships with their mentors influence their identities as interns (Smagorinsky et al., 2004) and determine their perceptions of success in their internship (Maynard, 2010). The typical

expectations of these roles arise from the norm of an in-person mentoring relationship, where both parties share physical space. This study examined the intern/mentor relationship when that traditional physical space became virtual.

Literature Review

Focused on clinical partnerships and practice, the second standard from the Council for the Accreditation of Educator Preparation (CAEP) states in its rationale, "Education is a practice profession and preparation for careers in education must create nurturing opportunities for aspiring candidates to develop, practice, and demonstrate the content and pedagogical knowledge and skills that promote learning for all students" (CAEP, 2013, para. 1). Opportunities for practice-based preparation occur throughout EPPs, traditionally culminating in an immersive field-based placement. As the CAEP language notes, the focus tends to be on content and pedagogical knowledge, not technological knowledge; however, the pandemic centered technology in our interns' field experiences, with all our interns experiencing at least part of their field experience virtually. Two relevant themes in the literature include (1) virtual field experiences and mentoring and (2) TPACK with preservice and early-career teachers.

Virtual Field Experiences and Mentoring

Literature specifically applicable to virtual field experiences is somewhat limited. With respect to virtual field experiences, Hixon and So (2009) identified three categories of technology-enhanced field experiences: (1) Type I field experiences in traditional, physical classrooms, with technology used for supervision, reflection, or communication; (2) Type II field experiences, involving remote observations via videos or videoconferencing; and (3) Type III field experiences, which use fully virtual tools such as virtual reality and computer-enhanced simulations. Due to the pandemic, our interns experienced a unique blend of Type I and II field

experiences: they interacted with students both asynchronously and synchronously in a variety of modalities (physically present in the classroom, attending virtually, or a combination of both). Downs (2015) studied inservice K-12 teachers completing an internship in a virtual school for an online teaching endorsement. Positive responses to their virtual internship included the novelty of the learning environment, the flexibility of the location, and the possibilities of meeting evolving needs within the realm of teaching and learning. Negative responses included the large time investment to plan and teach online, the lack of student interaction, and difficulty assessing students: one participant explained effective formative assessment required "talking directly to them and asking live questions in order to gain insight of how they are thinking at the moment based on their gestures, voice tone, and other nonverbal behavior" (p. 194). If experienced inservice teachers completing a program designed for online teaching faced certain challenges in virtual environments, our novice preservice teachers would likely face these challenges and more.

Additional research explored the efficacy of technology-based mentoring. In their synthesis of studies on technology-based mentoring for inservice teachers, Gentry et al. (2008) noted generally positive experiences across studies, though these findings were frequently self-reported and lacked triangulation with direct observation. Reese (2016, 2017) studied mentoring of preservice elementary music teachers over Skype, with mentees teaching and recording their lessons in the physical classroom, while mentors watched the videos and Skyped with mentees to reflect and debrief. This virtual mentoring resulted in more equitable conversations between mentees and mentors, addressing general pedagogical information (37%), subject-specific pedagogical information (26%), or classroom management (19%), topics common with in-person mentoring. Mentor challenges included technological limitations, such as the restricted webcam

view; the lack of real-time interaction; and being less able to perceive dynamics in teacher/student interactions. Benefits included additional time for reflection and discussions with the intern and professional development from learning from interns. These findings indicated that our interns and mentors could possibly experience reconfigurations of mentoring that would be beneficial (such as being able to discuss instruction beyond the constraints of time and space) but also introduce unique challenges.

Finally, existing research on interns' and mentors' experiences during the pandemic was extremely limited as we began our study, since the pandemic began only a few months before. Barnhart (2020) noticed two key shifts during the pandemic: (1) an increased recognition of the skills and knowledge interns bring to the mentoring relationship, and (2) new possibilities to use co-teaching to build on interns' and mentors' respective strengths. Therefore, the novel context of the pandemic caused mentors to acknowledge the strengths interns brought with them into the classroom and to channel those strengths through co-teaching. Next, preservice and early-career teachers' experiences with TPACK will be explored.

TPACK with Preservice and Early-Career Teachers

TPACK involves a sophisticated balance among multiple pedagogical considerations: technology, pedagogy, and content knowledge, all bound within the context of individual classrooms. Therefore, it was important to explore literature documenting how novice preservice and inservice teachers incorporated TPACK in their instruction. Focusing on the technology component of TPACK, Joo et al. (2018) surveyed secondary preservice teachers and found (1) higher levels of TPACK correlated with increased self-efficacy, perceived ease of use, and perceived usefulness; (2) perceived ease of use also correlated with perceived usefulness (the easier a tool was to navigate, the more the preservice teachers envisioned using it in the future);

and (3) higher levels of self-efficacy, perceived ease of use, and perceived usefulness resulted in higher levels of intention to use technology. However, other research noted pedagogical and content knowledge domains of TPACK may be stronger than technology-focused domains. Schmid et al. (2021) compared secondary preservice teachers' self-reported TPACK with their use of instructional technology in lesson plans and found CK to be present the most and TCK to be present the least. Agustini et al. (2019) surveyed and interviewed early-career teachers and discovered CK and PCK had the greatest influence on their pedagogy, while TPK and TPACK had the lowest influence. Therefore, while confidence with technology increases the likelihood that it is used in instruction (Joo et al., 2018), novice teachers often struggle the most with the technology-based aspects of TPACK (i.e., Agustini et al., 2019; Schmid et al., 2021).

Furthermore, teachers' self-efficacy with TPACK decreased during the pandemic. In Spring 2020, Mourlam et al. (2021) asked inservice teachers to self-report TPACK during and before (retrospectively) the pandemic on a Likert scale. Results indicated that teacher knowledge decreased on all TPACK domains except for TK and TCK during the pandemic. PK, PCK, and TPACK dropped to the point that teachers *disagreed* that they had knowledge in these areas during the pandemic. Therefore, while teachers may acquire more knowledge about digital tools when forced to resume their teaching responsibilities virtually, we understood that our interns and mentors may struggle with applying these technologies in productive, pedagogically relevant ways.

In conclusion, the pandemic redefined the traditional field-based internship experience in unexpected ways. While previous research indicated that mentoring could flourish in virtual spaces (i.e., Gentry et al., 2008; Reese, 2016, 2017) and could lead to increased recognition of the skills interns bring to mentoring relationships (Barnhart, 2020), challenges included

navigating technological limitations (i.e., Reese, 2016, 2017), transcending the previously-existing versions of technology-enhanced field experiences (Hixon & So, 2009), and building TPACK confidence with technology-related areas for preservice and inservice teachers alike (i.e., Agustini et al., 2019; Schmid et al., 2021). Even in a traditional internship, the learning curve is steep; our survey of existing research confirmed that additional challenges of teaching and mentoring in a virtual space would define our interns' and mentors' experiences.

Methods

In this article, we considered two research questions: (1) How did virtual instruction impact the experiences and interactions of interns and mentor teachers in Fall 2020? (2) How did virtual instruction impact the role of instructional technology and TPACK in Fall 2020?

Participants and Context

Our EPP is a five-year, undergraduate/graduate program where students graduate with their bachelor's degree and then return for a one-year master's degree. During the fall of the graduate year, interns take courses and complete a part-time teaching internship. Elementary-licensure interns complete fieldwork in schools two full days a week; secondary and PK-12 licensure interns complete an intensive one-month part-time internship. During the part-time fall internship, interns are placed in one classroom with one mentor. Traditionally, interns are physically present in the mentor's classroom to observe, support students during lessons, write and teach lesson plans, receive feedback, co-teach, and attend meetings and other school events. During this part-time internship, the intern fills support roles alongside the mentor's primary leadership in preparation for the spring full-time internship. In Fall 2020, this part-time internship was fully or partially completed virtually.

For our mixed methods research, we recruited interns and mentors across programs and placement school districts; a total of 14 interns and five mentors participated in data collection. From the elementary level, there were 11 interns (79%) and three mentors (60%); secondary, one intern (7%) and two mentors (40%); and PK-12, two interns (14%) and no mentors. Participants came from three nearby school districts.

The modality of instruction varied by district. All three districts started the first quarter (August through early October) with 100% virtual instruction. In the second quarter (mid-October through December), districts varied in their instructional modality. Some offered hybrid instruction with an option for students to stay virtual; some remained fully online. Some teachers in hybrid districts had both in-person and online learners, either simultaneously or at alternating times (i.e., morning in-person students and afternoon online students), or they were assigned to fully online or in-person instruction. Therefore, intern and mentor experiences varied widely, even within the same district.

Data Collection

Interns and mentors answered similar questions on separate surveys. To ensure the survey's content reliability and construct validity, we designed questions rating self-confidence in areas that (1) aligned with our existing intern evaluation (developed in 2017 based on another Virginia institution's CAEP-approved instrument and then tested for reliability and validity); (2) anticipated areas that could be a challenge for interns and mentors in a virtual space, as evidenced by existing research findings; and (3) aligned with the ten Interstate Teacher Assessment and Support Consortium (InTASC) standards (CCSSO, 2013). For example, questions 2, 3, 9, and 12 all aligned with InTASC Standard 3, Learning Environment. Additional questions gathered demographic information, such as endorsement area and primary instructional

modality; sources of knowledge, such as trainings, courses, and interactions with peers/colleagues; and open-ended responses asking (1) “Will you be utilizing low tech or no tech learning activities in your internship/teaching/mentoring? Please explain” and (2) “Any other comments about completing your internship/being a mentor in a virtual space?” Pre-surveys were administered in October 2020 and post-surveys in December 2020.

Data Analysis

The data were analyzed using a mixed-methods approach. The intern and mentor survey data were analyzed separately using descriptive statistics in Excel. All open-ended survey questions were coded using constant comparative analysis (Corbin & Strauss, 1990). Due to the small sample size (especially with only five mentors) and the nature of the research, the findings from the analysis are exploratory and are not intended to be generalizable to a larger population; however, we gained valuable insights about our participants’ experiences in their specific context and recognize that findings may transfer to similar situations or populations.

Results

Appendix A contains pre- and post-survey results for the 16 Likert questions for interns and mentors. Scores ranged from strongly disagree (1) to strongly agree (5). The greatest growth in survey results was mentors’ belief that a virtual internship would prepare their intern for future teaching. Both interns and mentors also demonstrated growth in using technology as a tool for collaboration with families. Across both pre- and post-surveys, both interns and mentors felt comfortable with basic computer skills and intern/mentor communication. Interns felt more confident in their knowledge of instructional technology tools than their mentors. Mentors felt confident accessing a distraction-free environment for instruction and using technology to communicate with colleagues. Despite the high rankings overall, scores for intern/mentor

communication regressed for both interns and mentors between the pre- and post-surveys, as did their confidence with using technology to evaluate data and student growth. For mentors, two additional score regressions indicated decreasing confidence in both evaluating instructional technology tools and troubleshooting technological difficulties. For both interns and mentors on both surveys, meeting the specialized needs of learners was the weakest area. Next, open-ended responses from interns and mentors will be analyzed.

Interns' Experiences in a Virtual Space

On open-ended survey questions, interns mentioned benefits of a virtual internship. Some interns acknowledged this experience would prepare them to teach in both in-person and virtual settings, realizing certain skills—troubleshooting technology, refining instructional delivery skills, motivating students to participate with tools such as Class Dojo, and using technology to plan interactive lessons—were applicable to both environments. Some interns felt they had more communication with families due to virtual learning than they would in a face-to-face setting. Therefore, benefits included skills that transferred between in-person and virtual instruction as well as opportunities they would not have in a face-to-face setting, such as communicating with families in new ways.

The most common concern was that a virtual experience would not prepare them for "normal," in-person teaching. Some typical routines, classroom management, and other "daily life" elements of in-person teaching could not be replicated in an online environment. One intern felt they were "less involved" overall in sharing teaching responsibilities than they would have been in-person. Additionally, several interns noted challenges with assessment in a virtual environment. Some students simply were not participating, and some students received help from family members on assessments. Building connections with students also was harder for some

interns in a virtual environment. Therefore, elements of in-person teaching that could not be directly replicated online—classroom management, shared teaching responsibilities, assessment, and connecting with students—were the main challenges interns faced.

Mentors' Experiences in a Virtual Space

In open-ended survey questions, mentors mentioned benefits of mentoring in a virtual space. A recurring benefit was the reversal of traditional roles of the intern as novice and mentor as expert. One mentor observed this was a unique opportunity to see experienced teachers pivot, adapt, and be in the "first year teaching experience." Another mentor described the mutually beneficial nature of the mentoring relationship: "My intern has helped me learn about technology while I help her learn about teaching." Mentors noted that even in a virtual environment, certain skills were the same as in-person teaching: there was a consistent responsibility to teach an intern about instructional practices, communication with families, and assessment, while maintaining open communication with the intern. One mentor stated that classroom management was "easier" in a virtual setting. Therefore, benefits included role reversals that allowed interns to lead and mentors to learn and the consistent responsibility to deepen interns' knowledge about classroom teaching, even in a new and ever-changing setting.

More mentors identified challenges of mentoring in a virtual setting. The most consistent concerns included assessment, differentiation, and preparing the intern for "normal," in-person teaching. Mentors worried that the struggles of online engagement—having little power to "make" students attend class, complete work, or learn—meant differentiation also suffered and opportunity gaps widened. One mentor did not feel they were helping their intern, despite the intern asserting they were. In summary, challenges included assessment, differentiation, engagement, and supporting the intern.

Interns' Perceived Role of Instructional Technology

When using instructional technology, the first consideration appeared to be access to technology. While technology was necessary for virtual instruction, interns reported less accessibility once some students returned to in-person learning because there were few computers remaining in the school buildings. To increase accessibility to learning materials, one intern explained the use of paper packets:

> The school has a ...file cabinet for each grade level. The teachers print and put everything inside the cabinet for families to come and pick up. The cabinet is outside; therefore, families are able to go when it is most convenient for them. Some of the class resources that are printed on paper are also created…on Google Classroom.

However, even avoiding instructional technology did not always increase access to instruction: as one intern noted, they could not grade paper-based assignments during virtual instruction because they "can't expect the student to have supplies [at home]." Therefore, interns found there was not one configuration that met all students' needs; offering choices seemed to offer the greatest opportunities for equity.

Interns also discussed issues related to content knowledge and pedagogy. Within early childhood placements, young children sometimes were still developing literacy skills, including digital literacy, which required careful planning of how to teach the content so young learners would be successful. Finally, some interns recognized the importance of technology, no matter the context. One intern explained, "Even in a 'normal' scenario, I would be looking for ways to incorporate technology;" this comment indicated a commitment to using instructional technology, even beyond required virtual instruction during a pandemic.

Mentors' Perceived Role of Instructional Technology

Mentors also made decisions about instructional technology based on accessibility. One mentor highlighted funding: once the district purchased certain licenses, products, and equipment, then they were able to use more technology in their instruction. Another mentor reported adapting paper-based instructional activities, such as graphic organizers, to digital environments using platforms like Google Docs because hard copies were not accessible in a virtual learning environment.

Some mentors experienced flexible access to learning through technology. One teacher explained how they used the Smartboard during hybrid instruction, allowing in-person and virtual students to see it simultaneously. Despite students being in different locations, technology provided a common experience. Similarly, another mentor used simulations to replace in-person science labs, and they also recorded lessons on Zoom to re-watch later. Creating instructional videos that students could revisit as needed indicated a novel form of differentiation.

At times, mentors intentionally *excluded* instructional technology. One mentor reported using a "real" calendar, books, and other artifacts to show students during virtual instruction, and another responded, "K-2 students need hands-on, minds-on coupled with discussions, investigations, and experiential opportunities." In early childhood, some mentors found an over-reliance on technology did not meet pedagogical, content knowledge, or social/emotional goals. As one mentor explained, "[too many] platforms can distract from the learning and be an unnecessary source of frustration for students. The goal is for students to learn, not have to figure out how to get a website to work." Finally, some mentors seemed to equate an avoidance of technology with a return to "normal" instruction. One mentor looked forward to returning to "medium tech" once in-person learning resumed, and another hoped in-person students "will be

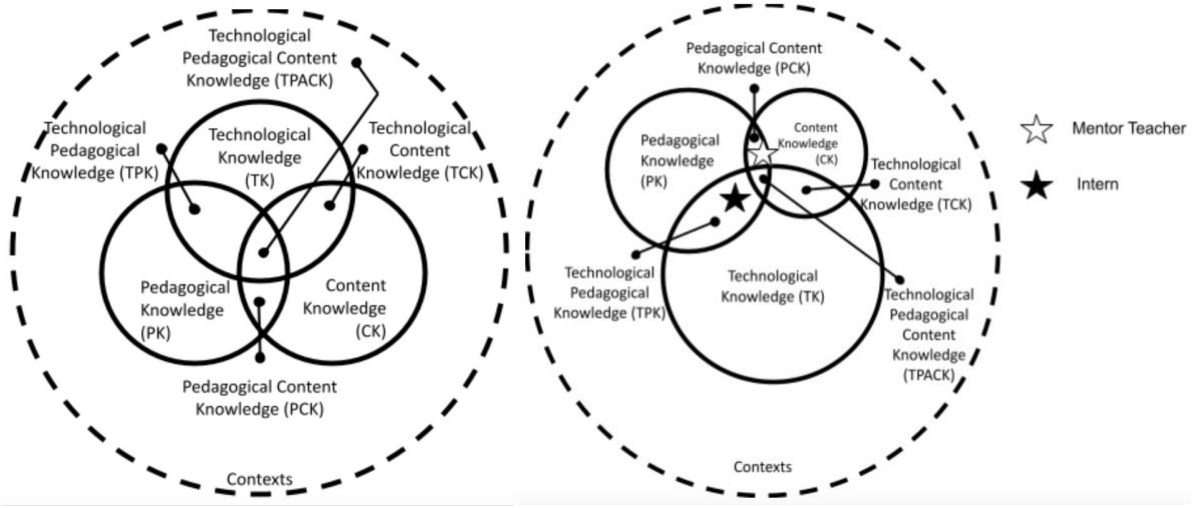
able to stay off their computers while in the classroom with me." Therefore, mentors at times felt that technology disrupted their students' learning and found or anticipated ways to avoid depending upon it.

Discussion

The results indicated the inversion of traditional roles in several contexts: first, the role reversals in mentor/intern relationships, and second, the role of technology in virtual instruction. These two findings suggested that our interns and mentors experienced a modified configuration of the TPACK framework (see Figure 3).

Figure 3

Configuration of TPACK (Mishra & Koehler, 2006) Based on Intern and Mentor Experiences



For our participants, the foundation and largest circle of TPACK became TK; CK became the smallest. The icons indicate apparent strengths and areas of focus for mentors (PCK) and interns (TPK).

Role Reversals in Mentor/Intern Relationships

TK led to role reversals between the mentor and intern. Traditionally, the mentor is the expert, and the intern is the novice, especially with PK and CK. However, interns emerged as TK experts: they were undergraduates when their own education suddenly pivoted to a virtual environment in Spring 2020, allowing them to see firsthand as students what did and did not work. Several mentors highlighted the benefits of increasing their own TK based on their interns' expertise. Similar role reversals arose in Reese's (2016) findings that mentors providing virtual feedback enjoyed learning from their intern, and Barnhart's (2020) findings highlighting the importance of recognizing the skills interns brought to the classroom.

Many mentors did not have deep and varied knowledge of TK. Some of their TK was outdated due to the quickly evolving nature of technology (Mishra & Koehler, 2006) and the time elapsed since earning their own teaching credentials. Mentors' surveys indicated decreasing confidence in troubleshooting technological difficulties the longer they spent in virtual instruction. These findings mirror Mourlam et al. (2021): teachers' self-ratings of five of seven TPACK domains decreased during the uncertainty of pandemic teaching. Therefore, mentors' lack of confidence with technology skills likely contributed to the role reversals that allowed interns to share their expertise in this area.

Role of Technology in Virtual Instruction

Whereas traditional approaches to in-person learning locate PCK as the core of teaching, learning, and assessment, thus driving the planning process (Koehler et al., 2013), teaching virtually meant technology was now the foundation of each lesson. Districts established expectations about which technology tools teachers could use in their classroom, and they had to fund LMS platforms, subscriptions, and equipment acquisition to ensure that all students had

access to devices and the internet. Next, students had to know how to use those tools, which related to TCK and TPK. Even skills as basic as teaching young children how to mute and unmute themselves on a Google Meet became part of the curriculum.

At times, technology seemed to interfere with TPK, PK, and PCK. Primary teachers noted the importance of hands-on learning with calendars, books, and other realia that could not be replicated through digital tools. Other mentors observed how technology could become overstimulating, distracting, and frustrating, interfering with students' learning. While interns felt some skills—adaptability, digital communication, and using technology to create interactive lessons—applied to both virtual and in-person teaching, other skills that were more comfortable in person—classroom management, building connections, instructional delivery, assessment, and differentiation—were entirely different in virtual spaces. Therefore, the weakest area for interns and mentors on both surveys related to meeting the specialized needs of learners. This finding was consistent with existing literature: Downs (2015) also found assessment and student connections were challenging in virtual internships for inservice teachers.

Finally, some interns and mentors demonstrated TPACK by acknowledging technology-infused learning's effectiveness in both in-person and virtual settings. Novel uses of technology aligning with TPACK included providing both in-person and virtual students with access to the same learning opportunities, regardless of location; presenting information in both digital and analog forms, such as having documents both on Google Classroom and in a filing cabinet outside the school; and recording lessons to watch later, allowing for re-learning. However, there were also indications that TPACK was not a regular practice during in-person learning, as indicated by mentors' comments anticipating the return of more familiar learning contexts, where technology was *not* the foundation of all learning and interactions.

Implications for EPPs

While the pandemic forced rapid innovations during our interns' experiences in Fall 2020, some findings from this study suggest ongoing innovations for EPPs. First, interns were able to serve as experts in virtual learning because of their previous experiences as students in virtual settings. Therefore, EPPs should prioritize opportunities for preservice teachers to experience meaningful instructional technology practices during coursework to build TPACK awareness and confidence, which may allow them to serve as technology experts in the intern/mentor relationship. Joo et al. (2018)'s findings that increased self-efficacy, perceived ease of use, and perceived usefulness result in higher levels of TPACK also support this recommendation.

EPPs should prepare both interns and mentors for shifting mentoring roles. Interns shared that they were able to share their expertise with technology, and mentors expressed gratitude for being able to learn from their intern. To redefine traditional intern/mentor roles with the intern as novice and mentor as expert, EPPs can coach interns and mentors to engage in respectful knowledge sharing, positioning themselves both as learners and leaders. More explicit support from EPPs with co-teaching also aligns with Barnhart (2020)'s findings. Continuing some virtual mentoring practices—such as following up on observations via video conferencing after a lesson—could free up mentors' time to learn from interns in more meaningful ways (Reese, 2016). Furthermore, EPPs could train mentors to provide feedback on all TPACK domains. Reese (2017) found that virtual mentoring conversations, like in-person mentoring, still focused largely on PK and CK. Several studies have shown that TCK, TPK, and TPACK tend to be the lowest areas of performance (Agustini et al., 2019; Schmid et al., 2021), and inservice teachers' confidence in several TPACK domains decreased during the pandemic (Mourlam et al., 2021).

Because higher levels of self-efficacy correlate with higher levels of TPACK (Joo et al., 2018), providing professional development for mentors on how to incorporate technology-centered TPACK domains into their teaching and into the feedback they provide their intern could prove beneficial for mentors and interns.

In the present study, differentiation and assessment in virtual spaces were also recurring weaknesses for interns and mentors. Downs (2015) also found that inservice teachers completing a virtual internship struggled with assessing students without in-person feedback. EPPs could support future teachers by featuring digital tools for providing synchronous and asynchronous feedback, such as using private chatting on a video conferencing platform to provide personalized feedback during virtual instruction.

Conclusion

In this study, survey data revealed that virtual instruction altered the experiences and interactions of interns and mentors and their use of instructional technology and TPACK. Interns' proficiency in TK led to role reversals in traditional intern/mentor relationships: both interns and mentors were situated as learners and experts at different times. During virtual instruction, technology became the foundation of every instructional experience. Not only did interns and mentors rely upon TK to choose and use instructional technology, but they also had to adapt for TCK (such as teaching students to mute themselves on Google Meet) and TPK (such as assessing and differentiating instruction in digital spaces). Interns and mentors alike struggled with adaptations of some elements of content and pedagogy—such as assessment, differentiation, classroom management, and relationships with students—in virtual spaces.

Beyond the ongoing pandemic, EPPs continue to redefine future opportunities for field-based experiences and explore possibilities for innovation. How can intern/mentor relationships

harness role-sharing as experts and novices? How can technology be leveraged to offer more responsive mentoring? How can TPACK be more meaningfully infused into EPP missions and coursework? While innovations for field-based internships emerged during the pandemic as emergency responses, taking these lessons forward allows for continual improvement of approaches to teacher education.

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Appendix A

Intern (n=14) and Mentor (n=5) Survey Results

Questions "I feel confident…"		Pre								Post								Mean Diff
		Frequency Distribution					Descriptive Statistics			Frequency Distribution					Descriptive Statistics			
		5	4	3	2	1	Mean	Median	Mode	5	4	3	2	1	Mean	Median	Mode	
Q1: …in my knowledge of basic computer skills (computers, the internet, emails, etc.). *InTASC Std. 4*	I	50%	50%	0%	0%	0%	4.5	4.5	4	79%	21%	0%	0%	0%	4.79	5	5	0.29
	M	20%	80%	0%	0%	0%	4.2	4	4	60%	40%	0%	0%	0%	4.6	5	5	0.4
Q2: …I have a distraction-free environment to deliver instruction to students. *InTASC Std. 3*	I	21%	50%	7%	21%	0%	3.71	4	4	21%	57%	7%	14%	0%	3.86	4	4	0.14
	M	40%	60%	0%	0%	0%	4.4	4	4	40%	60%	0%	0%	0%	4.4	4	4	0
Q3: …keeping students engaged in learning in a virtual space. *InTASC Std. 3*	I	0%	36%	36%	29%	0%	3.07	3	3	0%	36%	43%	21%	0%	3.14	3	3	0.07
	M	20%	0%	60%	20%	0%	3.2	3	3	20%	20%	60%	0%	0%	3.6	3	3	0.4
Q4: …about my knowledge of instructional technology tools. *InTASC Std. 4 & 7*	I	0%	71%	29%	0%	0%	3.71	4	4	29%	57%	14%	0%	0%	4.14	4	4	0.43
	M	20%	20%	20%	40%	0%	3.2	3	2	20%	20%	40%	20%	0%	3.4	3	3	0.2

Q5: …evaluating an instructional technology tool for use in my classroom. *InTASC Std. 4 & 8*	I	7%	50%	36%	7%	0%	3.57	4	4	14%	71%	14%	0%	0%	4	4	4	0.43
	M	20%	40%	40%	0%	0%	3.8	4	4	20%	0%	80%	0%	0%	3.4	3	3	-0.4
Q6: …integrating technology in my lesson that enhances student learning. *InTASC Std. 8*	I	29%	50%	21%	0%	0%	4.07	4	4	29%	64%	7%	0%	0%	4.21	4	4	0.14
	M	20%	40%	20%	20%	0	3.6	4	4	0%	60%	40%	0%	0%	3.6	4	4	0
Q7: …creating and administering assessments in a virtual space. *InTASC Std. 6*	I	21%	21%	29%	29%	0%	3.36	3	3	7%	57%	36%	0%	0%	3.71	4	4	0.36
	M	20%	20%	0%	60%	0%	3	2	2	20%	20%	60%	0%	0%	3.6	3	3	0.6
Q8: …using technology to evaluate student data to examine growth. *InTASC Std. 6*	I	14%	50%	36%	0%	0%	3.79	4	4	14%	50%	29%	7%	0%	3.71	4	4	-0.07
	M	20%	40%	20%	20%	0%	3.6	4	4	20%	0%	60%	20%	0%	3.2	3	3	-0.4
Q9: …meeting the specialized needs of learners in a virtual space. *InTASC Std. 1-3 & 7*	I	0%	7%	21%	57%	14%	2.21	2	2	7%	7%	29%	57%	0%	2.64	2	2	0.43
	M	0%	20%	0%	60%	20%	2.2	2	2	0%	0%	40%	60%	0%	2.4	2	2	0.2
Q10: …using technology as a tool for collaboration with colleagues.	I	29%	64%	7%	0%	0%	4.21	4	4	43%	57%	0%	0%	0%	4.43	4	4	0.21
	M	40%	40%	20%	0%	0%	4.2	4	4	40%	60%	0%	0%	0%	4.4	4	4	0.2

InTASC Std. 7 & 10																	
Q11: …using technology as a tool for collaboration with families. *InTASC Std. 10*	I	0%	50%	43%	7%	0%	3.43	3.5	4	29%	36%	36%	0%	0%	3.93	4	3	0.5
	M	40%	0%	40%	20%	0%	3.6	3	3	20%	80%	0%	0%	0%	4.2	4	4	0.6
Q12: …troubleshooting technology problems as needed. *InTASC Std. 3*	I	14%	57%	21%	7%	0%	3.79	4	4	29%	43%	29%	0%	0%	4	4	4	0.21
	M	20%	20%	20%	40%	0%	3.2	3	2	20%	0%	40%	40%	0%	3	3	3	-0.2
Q13: …teaching others to use technology. *InTASC Std. 8, 10*	I	14%	50%	21%	14%	0%	3.64	4	4	14%	71%	14%	0%	0%	4	4	4	0.36
	M	20%	0%	20%	60%	0%	2.8	2	2	20%	0%	60%	20%	0%	3.2	3	3	0.4
Q14: …this virtual internship experience will prepare me/my intern for my/their future teaching.	I	14%	36%	36%	14%	0%	3.5	3.5	3	21%	57%	7%	14%	0%	3.86	4	4	0.36
	M	0%	20%	60%	20%	0%	3	3	3	0%	80%	20%	0%	0%	3.8	4	4	0.8
Q15: …completing a virtual internship experience/serving as a mentor in a virtual space.	I	7%	36%	50%	7%	0%	3.43	3	3	14%	57%	14%	14%	0%	3.71	4	4	0.29
	M	20%	40%	20%	20%	0%	3.6	4	4	20%	40%	40%	0%	0%	3.8	4	3	0.2
Q16: I feel I have support and clear	I	71%	29%	0%	0%	0%	4.71	5	5	57%	43%	0%	0%	0%	4.57	5	5	-0.14

communication with/from my mentor/intern. *InTASC Std. 10*	M	60%	40%	0%	0%	0%	4.6	5	5	40%	60%	0%	0%	0%	4.4	4	4	-0.2