Journal of Pedagogical Research
Volume 6, Issue 5, 2022
https://doi.org/10.33902/JPR.202216914

Research Article

Virtual literacy instruction: An investigation of how elementary educators exhibited TPACK during COVID-19 school closures

Michelle Gonzalez[1] and Gihan A. Mohamad[2]

[1]*William Paterson University, United States (ORCID: 0000-0002-7777-6216)*
[2]*William Paterson University, United States (ORCID: 0000-0002-7216-5328)*

This mixed-methods study primarily explored how elementary educators exhibited TPACK in their virtual literacy instruction and the challenges they faced during the early months of the COVID-19 pandemic. Nine elementary-level educators participated in the study serving in the role of either general educator, special educator, or reading specialist. Data sources included a survey, email interviews, and teacher instructional materials. A hybrid thematic data analysis approach was utilized for the qualitative data, and basic descriptive statistical analysis was used for the survey data. TPACK and TPK were the most frequently coded domain among participants. TPACK was apparent across all areas of literacy instruction but less complex in the participants' phonics instruction. The greatest relationship between perceived ability and demonstration of TPACK occurred in the TPACK domain. Through the lens of TPACK, identified challenges of virtual literacy instruction were student technology access and skills, student motivation and engagement, and student learning and accountability; identified successes addressed student emotional well-being, educator collaboration, and new learning.

Keywords: Virtual instruction; Literacy instruction; COVID-19; Challenges; TPACK

Article History: Submitted 22 May 2022; Revised 8 November 2022; Published online 13 November 2022

1. Introduction

During spring 2020, schools across the nation faced obstacles in effectively educating students due to the COVID-19 pandemic. Schools shuttered their doors, and most teachers were forced into implementing virtual instruction. A study conducted by researchers at RAND found that 99% of teachers by May 2020 were facilitating online instruction (Hamilton et al., 2020). Few educators felt they were prepared to shift to online learning (Francom et al., 2021), especially at the elementary level (Eadens et al., 2022). Educators' feelings of success in the classroom immensely decreased when instruction pivoted to online (Kraft et al., 2020), possibly because virtual teaching has a large learning curve (Washburn et al., 2021). Also, at the start of the pandemic, online teaching and learning were familiar to only a minimum number of K-12 teachers and students, and those holding the majority of the experiences were working in higher education settings (An et al., 2021).

Address of Corresponding Author

Michelle Gonzalez, PhD, William Paterson University, 300 Pompton Road Wayne, New Jersey 07470, United States.

✉ gonzalezm77@wpunj.edu

How to cite: Gonzalez, M. & Mohamad, G. A. (2022). Virtual literacy instruction: An investigation of how elementary educators exhibited TPACK during COVID-19 school closures. *Journal of Pedagogical Research, 6*(5), 54-88. https://doi.org/10.33902/JPR.202216914

Forms of virtual instruction varied in quality and format across the nation in K-12 settings, from fully synchronous instruction to fully asynchronous instruction. School districts often dictated what type of instruction was acceptable, or teachers were limited by issues with student access to devices and the Internet (An et al., 2021). No matter the online teaching format, educators across the nation faced challenges in effectively implementing their daily literacy instruction. These challenges were most apparent at the elementary school level (Liao et al., 2021).

Due to an emerging body of existing research (Beach et al., 2021; Crosson & Silverman, 2022) and recommendations (Bennett et al., 2021; Chen & Greenwood, 2020; Fisher & Fry, 2020; Holt & Kreamer, 2020; Stoetzel & Shedrow, 2021; Washburn et al., 2021), only a little is known about how elementary educators implemented literacy instruction during the COVID-19 pandemic and how they overcame these challenges. The Technological Pedagogical Content Knowledge (TPACK) framework can serve as a lens to understand their literacy practices during virtual learning, and the challenges faced. Since educators relied heavily on technology to deliver instruction during the pandemic, using the TPACK framework as a theoretical model appeared logical as it emphasizes combining content and pedagogical knowledge with technology integration (Deng et al., 2017). Despite the availability of literature addressing literacy instruction during the pandemic, to the researchers' knowledge, no research exists that examines elementary educators' virtual literacy instruction before and during the pandemic in the context of TPACK. Prior to the pandemic, some research existed that examined TPACK and literacy instructional practices in the face-to-face format (Arya et al., 2020; Boschman et al., 2015; Hutchison & Colwell, 2015; Steckel et al., 2015). However, the preponderance of research related to TPACK and instructional practices in the face-to-face context occurred in science (Bilici et al., 2016; Ciampa, 2017; Jang & Tsai, 2012; Maeng et al., 2013; Ocak & Baran, 2019), math (Bonafini & Lee, 2021; Ciampa, 2017; Jang & Tsai, 2012), social studies (Ciampa, 2017) or special education (Anderson et al., 2017; Anderson et al., 2020). The research related to TPACK in the virtual setting is mainly reserved for the context of higher education, with limited research in the K-12 setting (Archambault & Crippen, 2009). To fill these identified gaps in research, further investigation is warranted to understand TPACK in literacy instruction in the virtual learning format. Therefore, this study aimed to explore elementary teachers' virtual literacy instruction through the lens of the TPACK framework and to identify their experienced challenges and successes.

2. Literature Review

The COVID-19 pandemic brought the challenges of online learning in the K-12 setting to the forefront of discussion among school leaders. Educators struggled with the pivot to online teaching, possibly because the skills required to teach online differ from those applied to teaching in person. At the start of the pandemic worldwide, this pivot to online teaching completely changed how many countries implemented education (Reimer et al., 2021). Hodges et al. (2020) label the early virtual teaching of the pandemic as emergency remote teaching (ERT). They define ERT as "a temporary shift of instructional delivery to an alternative delivery mode due to crisis circumstances" (par 13.). ERT is different from regular virtual teaching because it is not planned for upfront (Affouneh et al., 2020). Challenges that new virtual teachers experience under typical contexts are markedly compounded during emergencies like COVID-19 (Marshall et al., 2020). The following review will explore the unique educational challenges present during the COVID-19 pandemic and virtual instruction best practices. The TPACK framework will also be discussed in the context of experiences, beliefs, and literacy instruction. The literature review will conclude with a brief examination of the literacy practices during the COVID-19 pandemic.

2.1. Challenges in Virtual Instruction during the COVID-19 Pandemic

Before the pandemic, technology mainly supported student learning in the classroom; however, as educators pivoted to online instruction in March 2020, technology became the primary platform for providing instruction (Project Tomorrow, 2020). Teachers faced challenges as they were forced

to adopt more technology in their virtual instruction. Teachers' challenges can be categorized into external and internal (Ertmer & Ottenbreit-Leftwich, 2010; Johnson et al., 2017). External challenges include access to technology, lack of proper training, inadequate technological support (Johnson et al., 2017), and students' and parents' knowledge, dispositions, and behaviors (Ertmer, 1999). In contrast, internal challenges include teacher knowledge, beliefs, self-efficacy, and cultural influences (Ertmer & Ottenbreit-Leftwich, 2010). Many challenges related to the COVID-19 pandemic were external, such as time, support, technology access, student accountability, and student learning and engagement.

2.1.1. Time and support

Elementary teachers worldwide expressed their struggles with pivoting to virtual instruction without adequate time or support (Fauzi & Khusuma, 2020; Schleicher, 2020). Before the pandemic, educators often felt unprepared to integrate technology into their instruction in meaningful ways (Beschorner & Woodward, 2019), which could be related to limited training in implementing instructional technology (Schleicher, 2020). During the pandemic, educators also noted their limited training. For instance, Steed and Leech (2021) reported that 41.2% of early childhood educators received no training for virtual instruction. Francom et al. (2021) further found that 27% of educators wished they had previous training in online tools and pedagogy.

Teachers further reported that they were spending more time on lesson planning during the early pandemic (An et al., 2021; DeCoito & Estaiteyeh, 2022; Francom et al., 2021; Hanny et al., 2021; Steed & Leech, 2021), which may have been a result of their level of expertise of implementing technology into their instruction or their level of understanding of virtual instruction pedagogical practices (Hanny et al., 2021). Teachers tended to rely on substitution approaches in their virtual instruction, such as substituting print worksheets with scanned digital ones (Svrcek et al., 2022).

2.1.2. Technology access

Another challenge prevalent in the literature was student access to technology with greater need than the supply (Ogodo et al., 2021; Schleicher, 2020; Steed & Leech, 2021; Taimur et al., 2021; Walker-Dalhouse & Risko, 2020). Many students lacked access to the Internet and technology devices needed for successful virtual learning during the pandemic-related school closures (An et al., 2021). In the Teaching from Home survey, teachers reported that only approximately 59% of their students engaged in online learning, with the most likely contributing factor of not participating due to lack of access to reliable, high-speed Internet and Internet-enabled devices (Kraft et al., 2020). This lack of access resulted in the failure to implement quality online literacy instruction in some districts (Fisher & Frey, 2020).

2.1.3. Student accountability

In addition, student accountability during the COVID-19 pandemic was a prevalent challenge in the literature. Marshall et al. (2020) surveyed teachers early in the pandemic (March-April 2020), and the most reoccurring challenge noted by teachers was holding students accountable. Often school districts made online classes optional, with students facing no penalization for not attending or participating (Holt & Kreamer, 2020), or no consequences were implemented for students who did not meet standards during the COVID-19 school shutdowns (EdWeek, 2020). Many school districts did not have policies related to long-term emergency closures and the implementation of virtual instruction (Gerber, 2020), which could be a cause of no guidance regarding student accountability and grading. For those school districts requiring grading and assessment implementation, educators noted the difficulty of conducting assessments and evaluations to monitor student progress (Doll et al., 2021; Steed & Leech, 2021).

2.1.4. Student learning loss

COVID-19-related learning gaps in literacy have also been documented and predicted by researchers (Kuhfeld et al., 2020). For instance, researchers estimate that students lost at least two

months of reading growth due to pandemic-related school closures (Locke et al., 2021), with the most significant achievement gap occurring among young students, students with disabilities (Poletti, 2020), and students from low-income families (Kuhfeld et al., 2020). Research documenting the effects of learning loss due to the pandemic on specific literacy outcomes is emerging. For instance, at the beginning of the 2020 school year, Domingue et al. (2021) documented pandemic-related learning loss in reading fluency for students in grades 2-3, with students falling behind approximately 30% of expectations. Other researchers predict that the learning loss will result in long-term adverse effects on society and individuals (Dorn et al., 2020). However, the full extent of the impact of COVID-19 on learning loss may not be known for several years.

2.1.5. Student engagement

Student engagement is necessary for successful K-12 virtual learning (Borup et al., 2014). Worldwide, during the COVID-19 pandemic, educators identified student engagement as a challenge during virtual teaching (An et al., 2021; DeCoito & Estaiteyeh, 2022; Eadens et al., 2022; Francom et al., 2021; Taimur et al., 2021). The online environment, especially the asynchronous format, results in less interaction between students and teachers. Students reported feeling isolated due to less frequent interactions and collaboration with classmates and teachers (Walker-Dalhouse & Risko, 2020). Educators also reported having difficulty encouraging and promoting interaction in the asynchronous online environment leading to poor student engagement (Liao et al., 2021). Decreased feelings of engagement may occur because of the requirements of virtual instruction. For instance, unlike the traditional face-to-face classroom, online asynchronous education requires students to independently complete work without immediate support from teachers or peers.

2.2. Best Practices in Virtual Instruction during the COVID-19 Pandemic

Educators noted many virtual instructional challenges during the early days of the pandemic; however, educators also identified successes and recommendations for improved practice. During the early days of the pandemic, teachers' feelings of success were related to the school's working conditions. Kraft et al. (2020) found that teachers were likelier not to decrease in feelings of success when there was strong, dependable communication, equitable expectations, administrator effort recognition, focused professional development, and purposeful collaboration with colleagues. Doll et al. (2021) similarly found that educators felt it was beneficial when school leaders promoted educator collaboration and communicated frequently and clearly. Other recommendations during the COVID-19 pandemic focused on instruction, fostering relationships, and using digital tools.

2.2.1. Instructional recommendations

Researchers also made many virtual instructional recommendations to help promote a robust virtual learning classroom. For instance, Darby (2019) and Fisher and Frey (2020) recommended that online teachers should scaffold student learning and provide frequent feedback. This feedback should be consistent and positive, which can help improve student engagement (Washburn et al., 2021). Svrcek et al. (2022) further noted the importance of educators being intentional. Specifically, educators need a clear purpose for their instruction with careful consideration of standards, curricular goals, and pedagogical practices. Pedagogically, Liao et al. (2021) recommend that successful online teaching be organized. For example, visual schedules (Washburn et al., 2021) or set timetables (Doll et al., 2021) should be posted daily. Additionally, educators should rely on a unified lesson design (Liao et al., 2021), such as using Google Slides for a lesson template. Doll et al. (2021) further recommended that learning content should be centralized in one learning management system (LMS) to help improve class organization. A final key recommendation made by Liao et al. (2021) is that to make instruction more interactive and student-centered, educators should use synchronous online instructions rather than asynchronous ones, especially for elementary-aged students.

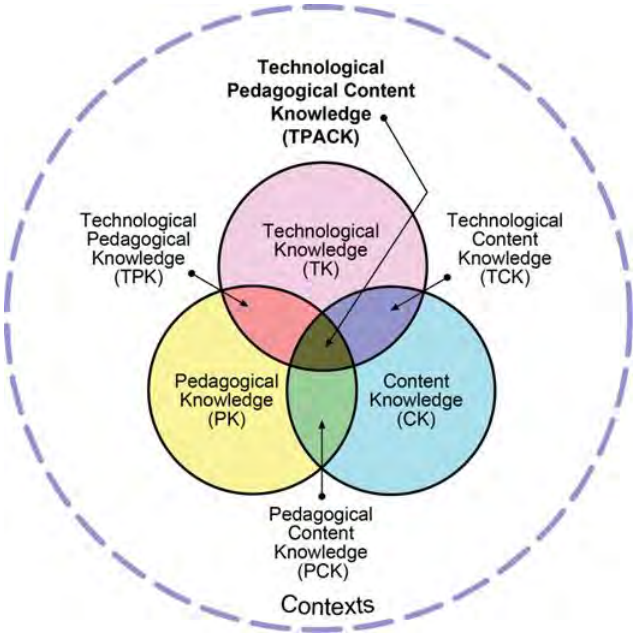
2.2.2. Fostering relationships

Taking time to connect with students and fostering teacher-student and student-student relationships was a prominent recommendation (Fisher & Frey, 2020) and helped improve student motivation and engagement during the pandemic (Liao et al., 2021. During the pandemic, social and emotional learning could not be forgotten, and educators recognized the need for authentic frequent check-ins (Correia, 2020). Some teachers helped maintain a sense of community by conducting daily Zoom lunches (Chamberlain et al., 2020) or check-ins (Doll et al., 2021). Educators worldwide recognized the need for connections and continued fostering teacher-student and student-student connections (Taimur et al., 2021). Some educators made breakout rooms in Zoom available so that students could work collaboratively with each other (Doll et al., 2021). Students collaboratively working led to more peer support, which Liao et al. (2021) found to help with student engagement.

2.3. TPACK

The TPACK framework can assist in understanding how educators implemented virtual instruction, especially in literacy, during the first months of the COVID-19 pandemic. TPACK is one of the most well-known frameworks that conceptualize the knowledge teachers need to successfully integrate technology into their instruction. The TPACK framework is an expansion of Shulman's (1986) work that attributed the effectiveness of teaching to the pedagogical content knowledge (PCK) with the inclusion of technological knowledge (TK) (Deng et al., 2017). Koehler et al. (2013) further expanded the model to include the intersection between and among these three knowledge areas portrayed as four more forms of knowledge: technological pedagogical knowledge (TPK), technological content knowledge (TCK), pedagogical content knowledge (PCK) and technological pedagogical content knowledge (TPACK), which is illustrated in Figure 1. Deng et al. (2017) further elaborated that TPK is the knowledge of applying technology to pedagogical instruction, TCK is the knowledge of applying technology to introduce the subject matter, PCK is the knowledge of ways to teach various subject matters, and TPACK is the knowledge of how to integrate the three types of knowledge in any instructional context. Cotton (2021) emphasized that individually understanding each TPACK concept is not the framework's goal. Instead, the framework focuses on understanding how technology integration helps teach these concepts.

Figure 1
TPACK Framework



Note. Reproduced by permission of the publisher, © 2012 by tpack.org

2.3.1. TPACK, experiences, and beliefs

Educators are not always confident in their beliefs about integrating the technology domains in the TPACK framework (Archambault & Crippen, 2009). Educators' integration of TPACK varies depending on contextual and other factors (Brantley-Dias & Ertmer, 2013; Cheng & Xie, 2018; Koehler et al., 2013; Niess, 2011). For instance, technology experience and value beliefs about technology play a significant role in educators' implementation of TPACK (Cheng & Xie, 2018). Specifically, teachers with more experience using technology and higher value beliefs about the use of technology have higher technology-related knowledge domains. The reverse also holds in which educators' TPACK and attitudes significantly predict technology integration (Raygan & Moradkhani, 2020). Other factors predict technology integration as well. For instance, Özgür (2020) found that as the level of stress related to technology integration increased, teachers' TPACK decreased. This finding may be explained by the idea that educators with more confidence, who most likely would have low levels of technology stress, can more effectively deal with challenges related to technology integration; thus, resulting in these educators more likely to use it than educators with less confidence (Anderson & Putman, 2019). Similarly, when educators exhibit good TPACK, they can more effectively deal with technology-related stress (Özgür, 2020) and are more likely to integrate technology. In addition, educators with positive value beliefs about technology and experience with technology have better TPACK.

2.3.2. TPACK and literacy instruction

In the content area of literacy, Arya et al. (2020) found preservice teachers (PST) demonstrated TPACK in their plans about half the time. While examining the design talk of in-service teachers during the planning of technology-rich emergent literacy activities, Boshman et al. (2015) also found that the teachers spent most of their time on TPACK. Hutchison and Colwell (2015) were interested in examining educators' planning to integrate iPads into literacy instruction. The researchers found that when given a structured planning framework, Technology Integration Planning Cycle (TIPC), PST were able to exhibit TPACK in their lesson plans. Steckel et al. (2015) explored how educators integrated technology into their literacy instruction using TPACK as a conceptual framework. Steckel et al. (2015) reached several conclusions but, in general, found that these educators used technology in sophisticated ways to differentiate and scaffold student literacy and language learning. Based on the limited number of studies, it is apparent that further research needs to be conducted to understand how the TPACK framework informs elementary educators' literacy instruction. The previous review examined TPACK and literacy instruction in traditional face-to-face education. It cannot be concluded if the same outcomes reported in the above studies would occur in a virtual or online teaching context. To the researchers' knowledge, no research exists that examines elementary educators' virtual literacy instruction before and during the pandemic in the context of TPACK.

2.4. Virtual Literacy Instruction during the Pandemic: Emerging Research and Recommendations

Much of the literature related to literacy instruction during the pandemic focused on instructional recommendations to help educators address the challenges associated with virtual literacy teaching (Holt & Kreamer, 2020) or practical application examples (Bennett & Peterson, 2021; Chen & Greenwood, 2020; Fisher & Fry, 2020; Stoetzel & Shedrow, 2021; Washburn et al., 2021) with fewer devoted to peer-reviewed research. The existing research focuses on teacher practices in literacy or perceptions (Crosson & Silverman, 2022) rather than student outcomes.

At the pandemic's start, there was an abundance of asynchronous and synchronous read-alouds available for students and educators to access. Many teachers reported using read-alouds frequently during virtual instruction (Steed & Leech, 2021). Read alouds are a common practice in literacy instruction, and research has consistently shown that this practice can support language and literacy development (Hoffman, 2011; Lennox, 2013). Educators realized that shifts in their

read-aloud instructional pedagogy needed to occur for virtual read-alouds. Stoetzel and Shedrow (2021) recommended that discussions should be in small groups and student-led when possible for synchronous contexts. On the other hand, in asynchronous classrooms, educators should set up discussion boards where students can post text or videos about the read-alouds. Stoetzel and Shedrow further recommend that caregivers could take part in the facilitation of book discussions. They suggest that parents record the discussion, allowing teachers to access and evaluate student learning.

Crosson and Silverman (2022) explored how the pandemic impacted early literacy instruction for emergent bilinguals (EB). The researchers found that teachers from fifty K-2 public schools reported decreased literacy instruction across all literacy practices during the pandemic. Though a reduction in literacy practices occurred across skills, the educators perceived that code-focused skills were more feasible than other literacy areas and that language-focused practices were the most challenging. Further, Beach et al. (2021) conducted one of the few studies that examined the impact of virtual literacy instruction on student outcomes. The researchers adapted a phonics program, *Sound Partners*, to be implemented in a virtual format during a summer reading camp with 35 low-income rising second and third graders reading below grade level. The researchers hoped to prevent the "summer slide." After the intervention, students maintained their accuracy and fluency skills and showed improvement in reading mastery tests.

2.5. The Aim

The current study was guided by the following questions to address the gaps in the research:

RQ 1) How do elementary educators exhibit TPACK in their practice during virtual literacy instruction?

RQ 2) How do educators perceive their TPACK, and how do these perceptions compare to practice?

RQ) 3What were the challenges and successes of virtual literacy instruction?

3. Method

A concurrent nested mixed methods design with qualitative data given the most weight (Creswell et al., 2003) was utilized to answer the research questions and understand how TPACK informed elementary educators' virtual literacy instruction and their challenges during the COVID-19 pandemic. The researchers merged data from open-ended interview questions and document review with data from instrument-based questions (survey) with priority given to the qualitative data to ensure a more comprehensive analysis of the research questions (Creswell, 2014). The study employed a pragmatic worldview that puts the emphasis on the research problem and employs all approaches available to understand it (Creswell, 2014).

3.1. Participants

A purposeful sampling strategy was utilized in the study. Participants were recruited from a pool of graduate students enrolled in education programs at a university in the northeast United States. Educators needed to teach literacy virtually during the COVID-19 pandemic (synchronously or asynchronously) in grades PreK through fourth and use technology in their literacy instruction to participate in the study. These educators worked as special educators, general educators, or specialists (i.e., Reading Specialists). Potential participants' email addresses were obtained through the university's database. Emails were sent inviting these educators to participate. Pseudo names were created for each participant to ensure anonymity.

A total of nine educators participated in the study. Four participants served in the role of general education teacher, two in the role of a reading specialist, two in the role of special education teacher, and one in the role of bilingual teacher. No matter the teaching role of the participant, most participants worked with at least one at-risk student or student with a disability. Participants' education experience ranged from five to fifteen years with a mean of 8.56 years.

Most participants earned an MEd in Literacy or were enrolled in an MEd Literacy program (n = 7). Aliana was pursuing her Master of Art in Education, and Ava was pursuing only her certification as a Reading Specialist. Please see Table 1 for further information about the study participants.

3.2. Data Collection

Data were collected through email interviews, surveys, and document reviews (i.e., literacy instructional materials and participant-created videos). The initial and follow-up interviews were conducted by email rather than in person (i.e., Zoom). The email interviews were selected because they allow participants to respond to the interviews at a time convenient to them (Gibson, 2014). This format of interviews also provides control to the participants by permitting them to spend as much or as little time on the interviews (Mason & Ide, 2014). Email interviews further enable the participants to reflect on their answers before writing their responses (Hawkins, 2018). In contrast, email interviews may result in shorter and more concise responses because written responses take longer to compose than spoken responses, or the interviews lack the social cues in in-person interviews (Fritz & Vandermause, 2018).

Nevertheless, email interviews were selected over in-person interviews to increase convenience for the participants. Because it was also felt that the participants might be experiencing "Zoom fatigue" because they spent most of their workday teaching students virtually, resulting in their reluctance to participate in a virtual interview. The initial interview (Appendix) consisted of semi-structured open-ended questions regarding the participants' literacy instruction, use of technology, professional development opportunities, student outcomes, and challenges. To ensure content validity, the researchers consulted relevant literature, and an expert in literacy and technology, the first researcher, developed the interview questions. Email interviews are an effective and reliable form of data collection (Fritz & Vandermause, 2018). However, a few steps were taken to improve the trustworthiness of the data. For instance, the researcher utilized the same interview process for each participant. Specifically, the same researcher interviewed all participants using the same semi-structured interview questions. The researcher asked all participants the second round of interview questions based on their initial responses. With several participants, multiple email exchanges occurred, encouraging prolonged participant engagement, which according to Lincoln and Guba (1985), promotes credible findings. Finally, when the participants' answers were unclear or vague, the researcher asked clarifying follow-up questions, which can be considered a form of member checking (Lincoln & Guba, 1985); thus, increasing the trustworthiness of the results

Based on the participants' initial responses to the interview questions, they were asked follow-up questions again through email. These questions aimed to have participants expand or clarify any responses recorded in the first round of interviews. In some cases, further follow-up questions were asked, which helped simulate a back-and-forth conversation. A sampling of these follow-up questions can be found in the Appendix. Participants also shared various literacy instructional materials they utilized during their virtual instruction in the follow-up responses. These resources included recorded instructional audio and video files, worksheets, interactive games, Google Slides, and links to activities created on various learning platforms (i.e., Seesaw, edPuzzle, Gynzy).

In addition, participants completed a 24-item exploratory survey using Qualtrics. They rated their competency in TK, PK, and CK and their competency in TCK, PCK, TPK, and TPACK in the context of literacy. This exploratory survey (Appendix) was adapted from the survey used in Archanbualt and Crippen's (2009) research, which examined TPACK among K-12 online distance educators. To ensure the validity of the survey instrument, Archanbualt and Crippen conducted a pilot study and further established content validity through expert review. The authors found acceptable internal consistency across TPACK domains measured. The changes made to the survey in the current study were minimal. They included the addition of the term literacy (n = 11) or the phrases in literacy (n = 6) or during literacy (n = 2) to ensure that the participants completed the

Table 1
Participant Demographics

	Sex	*Age*	*Yrs. in Ed*	*Position Grade Level*	*Grade Level*	*Highest Degree Earned*	*Information about Students*
Tamara	F	54	12	Reading Specialist	4th- 5th	MEd in Literacy	Students at-risk and with learning disabilities.
Cecile	F	26	4	General Education Teacher	K	Bachelor's Degree	Students of mixed abilities with some ELLs and students with disabilities.
Aliana	F	32	5	Special Education Teacher	PreK - K	Bachelor's Degree	Students of mixed abilities with some students with Autism.
Leah	F	34	12	General Education Teacher	3rd	MEd in Literacy	Some students receiving basic skills instruction
Kelly	F	30	5	General Education Teacher	4th	MEd in Literacy	Students of mixed abilities with some struggling readers and writers.
Mia	F	29	5	Bilingual Teacher	3rd	Bachelor's Degree	L3s, L2s, or L1s students with half of the class below grade level in reading and writing.
Jaime	F	35	12	General Education Teacher	2nd	MEd in Literacy	Students of mixed abilities with monolingual students.
Claire	F	45	15	Reading Specialist	K-4th	MEd in Literacy	Students at-risk and with learning disabilities.
Ava	F	32	7	Special Education Teacher	4th	Master of Arts	Students of mixed abilities, some with learning disabilities.

survey in the context of their literacy instruction and to improve content validity. Five survey items went unchanged and internal consistency was not measured because the participant sample size was < 30 (Samuels, 2015). Before completing the survey, participants were asked standard demographic questions (i.e., gender, age, years in education, position, grade level, and degree earned) and information about their students (i.e., class size, ELLs, needs, abilities, special needs, etc.).

3.3. Data Analysis

In order to identify instructional challenges and successes and how the participants exhibited TPACK in the virtual literacy instruction, a hybrid thematic qualitative data analysis approach was utilized to identify patterns and themes in the interview transcripts and participant instructional materials. A hybrid approach can provide a more balanced and comprehensive view of the data and fits well with thematic analysis due to its flexible nature (Xu & Zammit, 2020). Braun and Clarke's (2006) approach to thematic data analysis was utilized to guide the analysis. Braun and Clarke (p. 87) outline six steps (1) Familiarizing yourself with your data, 2) generating initial codes, 3) searching for themes, 4) reviewing themes, 5) defining and naming themes, and 6) producing the report) to thematic analysis.

The email interview transcripts and work samples were first read and reviewed to become familiar with the data. Then, email interviews were converted to PDFs, where each participant's initial and follow-up emails were combined into one file. Interview and participant instructional material files were next uploaded to Dedoose for analysis. Links to participants' web-based resources were copied to Word documents and then uploaded for each participant onto Dedoose.

The initial and follow-up interviews were coded first using a hybrid approach. In a hybrid approach, analysis is driven by theory (deductive) and data (inductive). The deductive and inductive approaches were used concurrently instead of separately. Interview texts were divided into segments of meaning. Text segments typically contained a few sentences of related meaning. Text segments could be labeled with more than one code. Inductively codes were generated by looking for patterns in the data. Deductively the data was analyzed using the TPACK framework with seven pre-determined codes (TK; PK; CK; TPK; TCK; PCK; TPACK).

All interview transcripts were coded collaboratively. Analytical discussions occurred until an agreement occurred to resolve any discrepancies in coding, improving the rigor of the data analysis. Coding categories were changed, merged, or generated when needed during the data analysis process. Memos were used throughout the coding phase, which allowed reflections and thoughts to be recorded during data analysis. After coding the interview transcripts, thematic deductive analysis was utilized using the seven TPACK pre-determined codes for the instructional materials. Analysis of the instructional materials allowed for further clarification and triangulation of the interview data.

After all the interviews and instructional materials were analyzed, the code counts were exported from Dedoose to Excel to help begin the generation of themes. The excel spreadsheet was examined for the most frequent codes generated through deductive and inductive analysis. The interview excerpts paired with the most frequent codes were reviewed and analyzed to develop emerging themes. In this search for overarching themes, it was considered how appropriate codes could be sorted, collated, and combined (Nowell et al., 2017). It was also ensured that the emerging themes aligned with the research questions. The themes were finally refined by ensuring that the themes had informative and engaging names (Xu & Zammit, 2020). The themes generated through the qualitative analysis were primarily supported by interview exerts and work sample examples; however, quantitative results from the administrated survey were used to corroborate or support the qualitative findings (Creswell & Plano Clark, 2006).

To analyze how educators perceive their TPACK and compare these perceptions to practice, descriptive statistical analysis of the survey and the counting of TPACK codes generated during qualitative analysis were utilized. To determine the participants' perceptions of their TPACK, a

mean score was first found for each TPACK element measured on the survey for each participant. To be able to compare these perceptions to practice, the participants' mean scores for each TPACK element were labeled as high ability (mean score of 4.00-5.00), medium ability (mean score of 3:00-3.99), or low ability (mean score of 1-2.99). Next, the qualitative data were transformed to quantitative data (Cresswell & Plano Clark, 2006; Cresswell et al., 2003) by counting the TPACK codes from each participant's interview transcripts and work samples and sorted by TPACK element and level of rated ability (high, medium, or low). A mean code count was calculated for each TPACK element and level of rated ability. A bar graph was then created to compare the mean code counts across ability levels and the TPACK domain.

4. Results

The major themes generated through the analysis of collected data are TPACK perceptions and literacy applications and the challenges and successes of virtual literacy instruction. The analysis also yielded sub-themes within each of the major themes. The research findings are supported by the presentation of excerpts of data drawn from the interviews and support documents.

4.1. TPACK

The first theme addressed is TPACK and its application in literacy instruction. First, the overall counts of the TPACK domains and the TPACK counts disaggregated by participant characteristics will be discussed. Then participants' perceptions of their TPACK and how their perceptions compare to practice will be presented. Finally, TPACK and TPK in literacy instruction will be discussed.

4.1.1. TPACK and participant demographics

A total of 181 excerpts were coded with the TPACK domains. Overall, there were more excerpts related to TPACK (32.60%) and TPK (18.79%) in comparison to TK (13.26%), PCK (12.16%), TCK (10.50%), PK (6.63%), and CK (6.08%). TPACK excerpts were then disaggregated by participant age, years of teaching, degree, teaching position, and grade level. More TPACK excerpts were present in the 26-30 age range (m = 11.67); 4-6 years teaching (m = 9.75); Bachelor's degree (m = 7); General educator position (m = 10.25; and grades third through fourth (m = 8.75) categories. Please see Table 2 for further information about the disaggregated TPACK excerpts.

Table 2
Mean TPACK Excerpts by Participant Demographics

Demographics	*n*	*M*
Participant Age		
26-30	3	11.67
31-35	4	4.5
41-50	2	3.0
Years Teaching		
4-6	4	9.75
7-10	1	3.0
11-14	3	4.67
15-20	1	3.0
Teaching Position		
General educator	4	10.25
Special educator	2	3.5
Bilingual educator	1	5.0
Reading specialist	2	3.0
Grade Level		
K-2	2	7.0
3-4	4	8.75
Multi	3	3.33

4.1.2. Perceptions and TPACK

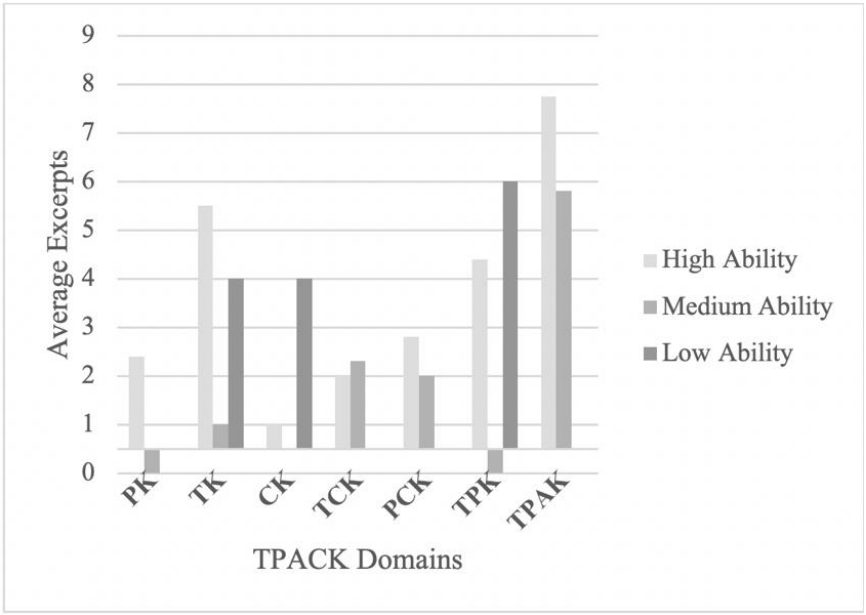
Participants rated themselves the highest under the TCK, PCK, CK, and PK domains. Participants were the least confident in the TK and TPK domains. Mia (M = 5.0) was the most confident in the PK domain, and Ava (M = 3.0) was the least confident. Kelly (M = 5.00) was the most confident in the TK domain, and Cicile (M = 1.00) was the least confident. Ava again was the least confident (M = 2.67) in the CK domain, with Leah, Kelly, Cicile, and Tamara (M = 4.67) being the most confident. Leah and Mia (M = 5.00) were the most confident in the TCK domain, and Jaime and Ava (M = 3.33) were the least confident. Next, in the PCK domain, Mia (M = 5.00) again was the most confident, and Cicile (M = 3.50) was the least confident of the participants. Leah (M = 2.50) rated herself the lowest in the TPK domain, with Kelly and Tamara rating their ability the highest (M = 4.75). Ava and Claire had the lowest mean rating (M = 3.00), and Kelly and Mia (M = 4.50) rated themselves the highest in the TPACK domain. When examining each question from the TPACK survey, participants rated themselves the highest on that statement: My ability to use various courseware programs to deliver literacy instruction (e.g., Google Classroom, Zoom, etc.). (M = 4.67) and lowest on the statement: My ability to assist students with troubleshooting technical problems with their personal computers. (M = 3.11). The TK domain had the most variability (SD = 1.20) across participants, and PCK had the smallest variability (SD = 0.52). Kelly (M = 4.71) was the most confident across the TPACK domains, and Ava (M = 3.12) was the least confident.

Table 3
TPACK Perceptions

Participant Name	*PK*	*TK*	*CK*	*TCK*	*PCK*	*TPK*	*TPACK*	*Mean*
Leah	3.67	4.33	4.67	5.00	4.00	2.50	3.00	3.88
Kelly	4.67	5.00	4.67	4.67	4.75	4.75	4.50	4.71
Mia	5.00	2.00	4.33	5.00	5.00	4.00	4.50	4.26
Aliana	4.33	3.67	3.67	4.67	4.25	4.00	4.25	4.12
Jaime	3.67	3.00	4.00	3.33	3.75	3.00	3.25	3.43
Claire	3.33	3.67	3.67	3.67	3.75	3.25	3.00	3.48
Cecile	4.00	1.00	4.67	4.33	3.50	4.50	3.50	3.64
Tamara	4.33	3.67	4.67	4.00	4.50	4.75	4.25	4.31
Ava	3.00	3.33	2.67	3.33	3.75	2.75	3.00	3.12
Mean	4.00	3.30	4.11	4.22	4.14	3.72	3.69	3.88
SD	0.65	1.20	0.69	0.67	0.52	0.87	0.670	0.75

A relationship between perceived ability and demonstration of TPACK was evident in some TPACK domains. The most substantial relationship occurred in the TPACK domain. Those participants who noted the highest ability in TPACK also exhibited the most TPACK in their instruction as measured through work samples and interview excerpts. A more subtle relationship occurred in the PK and PCK domains, where participants who rated the highest ability in these domains exhibited more instances in their instruction. The domains of CK and TPK had contradictory results where participants who noted the lowest ability in these domains demonstrated more examples in their teaching. Figure 2 further displays the relationship between perceived ability and the TPACK domains.

Figure 2
Relationship between perceived ability and TPACK domains



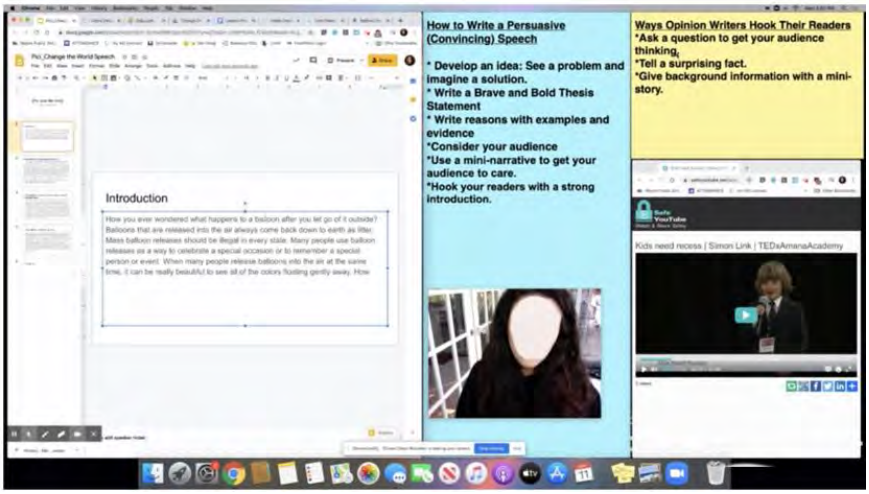
4.1.3. TPACK in writing, reading, and phonics instruction

TPACK was the most frequent coded domain (32.6%) and was apparent in the participants' instruction across literacy domains. However, TPACK was more apparent and complex in the participants' writing and reading instruction than phonics or word study instruction.

Writing. Writing instruction was a challenge to implement during virtual instruction for many participants. However, when analyzing the qualitative data TPACK in writing instruction was most apparent in Leah and Kelly. This finding corresponds with the results of the TPACK survey and how participants rated their ability level. For instance, Kelly rated herself the highest in TPACK (4.5) across participants. On the other hand, even though Leah demonstrated TPACK in her writing instruction, she did not feel confident in her ability in this domain (3.0). However, Leah, in addition to Kelly, showed high perceived ability in their technology knowledge (TK Kelly 5.0; Leah 4.33) and integrating technology and literacy content (TCK Kelly 4.67; Leah 5.0).

In the survey, both Kelly and Leah rated themselves high (5.0) in their "ability to use technological representations (i.e., multimedia, visual demonstrations, etc.) to demonstrate specific concepts in literacy." Qualitative data also revealed that Kelly was confident in her use of technology in her writing instruction and that she used the Google Suite regularly before and during the pandemic. For example, Kelly created multiple scaffolded interactive Google Slides with embedded videos and recordings to guide students through the writing process. Leah also used Google Slides as a place for students to write drafts of their pieces. Each slide served as a section of the graphic organizer students used in the pre-writing stage. Leah further shared an example of a recorded writing lesson where she taught and modeled how to write an introduction for a persuasive piece. In her lesson, she used multiple technology platforms to meet her lesson objective. Leah used edPuzzle to record the lesson. You can see in Figure 3 that Leah used Google Slides to write a model introduction. While she recorded the video, Leah wrote this introduction so that students could witness her thought process. Embedded on her screen are sticky notes that Leah filled out while teaching. These notes served as key points for students to remember. On the same screen, Leah embedded a video that showed a child trying to persuade an audience for more recess. Leah's writing lesson was the most exemplar TPACK example shared.

Figure 3
Writing Lesson TPACK Exemplar



Reading Instruction. In addition, TPACK was apparent during participants' reading instruction. Participants created tutorials or mini-lessons synchronously and asynchronously to help portray new concepts in reading or address misconceptions. Participants used additional programs other than Google Slides or more advanced features of programs to encourage student learning. For instance, Mia shared her screen and modeled strategies with her students during Google Meets. In one example, Mia modeled how to annotate using the program Raz-Kids, which is a library of leveled interactive eBooks. Mia noted, "I projected a text from Kids A-Z (Raz-Kids) and read three pages from my choice of topic," and "I also refreshed their memories on how to use the 'sticky notes' feature on Kids A-Z to help them take notes as they read." Aliana used an online interactive program called Gynzy during her virtual reading instruction. During synchronous sessions, Aliana shared her screen with students and guided them to "sequence events in stories." She also noted in Gynzy, "I can write down names of the characters in a specific story for some of my advanced students and use this tool to see who can recall the characters in the story."

Overall participants, in the survey, noted high confidence in "my ability to use various courseware programs to deliver literacy instruction" (M = 4.67). Qualitative analysis revealed what programs were used and how participants used these programs in their literacy instruction. Participants also found platforms to encourage students to practice reading fluency or independent reading. Leah decided to use Flipgrid to promote fluency. After students watched a video of her instruction and modeling, Leah noted, "I post a Flipgrid topic in which students are asked to record themselves reciting two stanzas of the lesson's poem with fluency." To promote independent reading practice, Cecile, on the other hand, wanted her students to practice reading independently and decided to use the platform Seesaw to accomplish her outcome. Participants would first listen to a story and then record themselves reading. Platforms like Flipgrid and Seesaw allowed students to independently practice reading and get teacher feedback and allowed the teachers to monitor student progress.

In addition, Cecile used Seesaw for her students to practice reading comprehension. After listening to or reading *Click Clack Moo, Cows that Type,* students had to drag the characters and the book's setting into the appropriate spaces in the activity. Figure 4 illustrates this activity. On the other hand, Leah used the advanced features of Google Slides and Screencastify to record a voiceover for her poetry lesson, where students learned about identifying the mood of poems. Leah used textboxes and underline features of Google Slides to highlight key points in her lesson and poems. She selected bright contrasting colors for the text, background, text boxes, and underlined text. Leah further zoomed into images so her students could focus on the key areas of the mentor poem. Figure 5 shows one slide of her presentation. TPACK was identified during reading instruction, but it was used more complexly than in phonics instruction, which is

discussed in the next section. Participants were more likely to use various technology platforms or the more advanced features of programs like Google Slides in writing and reading instruction.

Figure 4
Seesaw Comprehension Work Sample

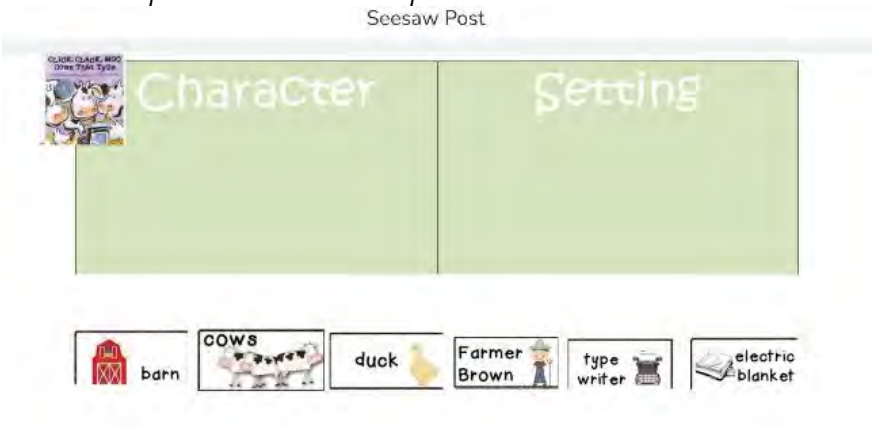
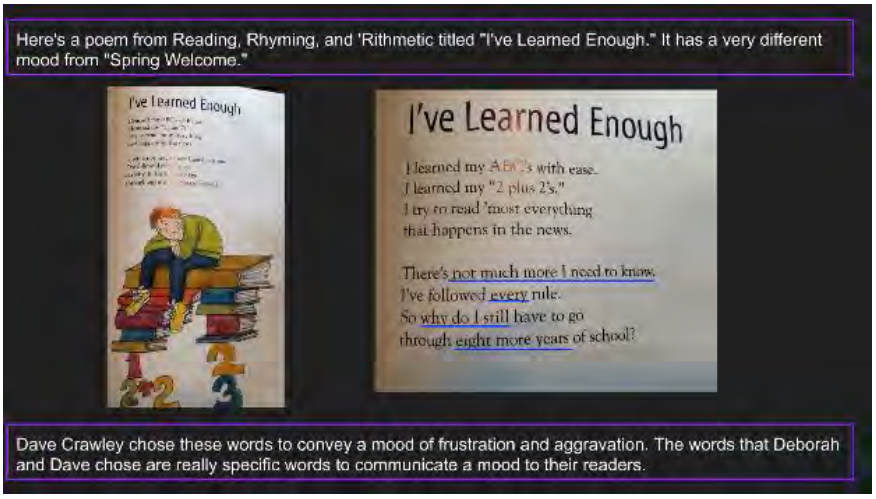


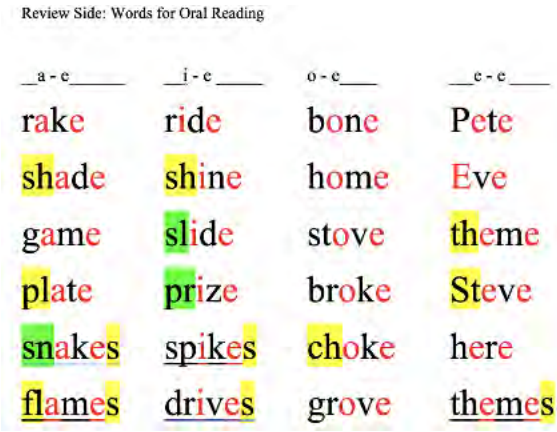
Figure 5
Google Slides Poetry Work Sample



Phonics Instruction. Participants considered and used TPACK when planning and implementing their phonics instruction; however, they did so in a less complex way. Participants typically recorded an instructional video for students to watch, transferred paper copies of workbook pages to digital copies, or shared their screens for drill work during synchronous instruction.

Ava, a special education teacher, conducted synchronous Orton-Gillingham (OG) lessons daily. For instance, Ava shared, "I would meet with students on Microsoft TEAMS and would share my screen with them when going over their word lists and other controlled reading that focused on the specific phonogram." Figure 6 illustrates the wordlists with Ava's specific phonogram focus during her TEAM meetings. She utilized a Word document and the highlighting feature to help students focus on each word. Ava considered TPACK, with much of her instruction mirrored what may occur in a face-to-face environment.

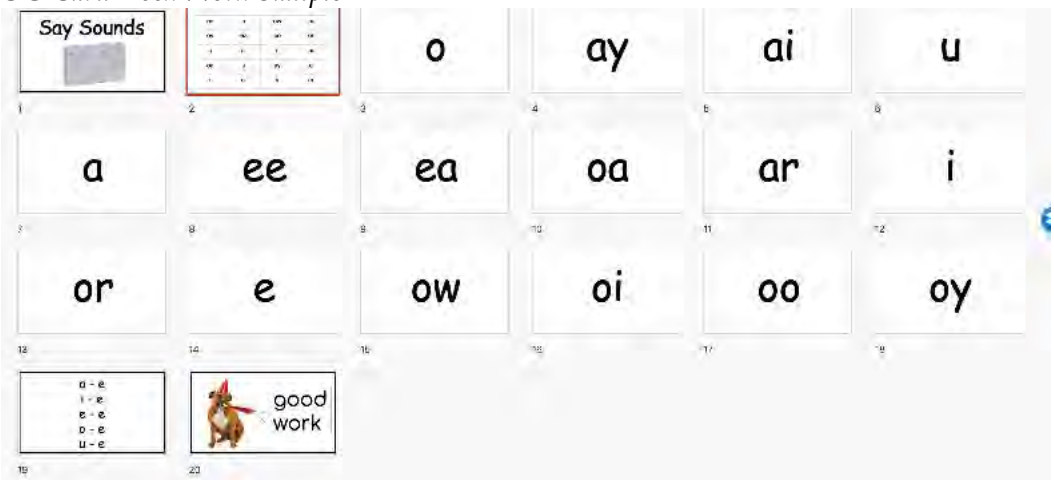
Figure 6
Phonics TPACK Work Sample


Review Side: Words for Oral Reading

_a-e_____	__i-e____	o-e___	__e-e___
rake	ride	bone	Pete
shade	shine	home	Eve
game	slide	stove	theme
plate	prize	broke	Steve
snakes	spikes	choke	here
flames	drives	grove	themes

Claire, also a reading specialist who was required to continue implementing OG instruction synchronously by Zoom, used Google Slides to have students practice articulating different sounds. She replicated the OG card deck using individual slides for each grapheme or grapheme pattern. Figure 7 illustrates Claire's virtual card deck.

Figure 7
OG Card Deck Work Sample



Like Ava, Leah's virtual word study instruction mirrored her traditional instruction, except for recording asynchronous lessons and creating digital workbook pages. Leah noted, "Students are engaged in the same Word Study routine as in school, but their lessons are recorded in a video, and the workbook pages were transformed into Google Forms (content is the same)." Tamara also created digital PDF workbook pages by scanning paper pages. She used these pages as independent work and as work to be completed during synchronous classes. Tamara ensured too that she followed the same phonics scope and sequence during virtual learning. During her synchronous classes, she tended to use tools similar to tools used in her classes before the pandemic. Tamara noted,

> I designed each lesson from where my students were in their scope and sequence. I used the Recipe for Reading book and introduced our new concept using post-its and a small whiteboard so my students could see the new lesson, for example, learning the trigraph sound of /tch/. My students had to say the new word: (I.e., witch), spell it, and put it in a sentence.

Cecile, a kindergarten teacher, also utilized presentation slides during her word study instruction. During her synchronous meetings, Cecile would introduce the focus word family on a slide, encourage students to practice reading a list of related words, and then utilize a poem with

the corresponding word family words. Figure 8 illustrates an example of Cecile's word study slides.

Figure 8
Word Study Work Sample

Participants utilized direct and explicit instruction for phonics, most likely during synchronous held classes. Participants were more likely to use only one or two types of technology during phonics instruction (i.e., Zoom and Google Slides/PowerPoint).

4.1.4. TPK in literacy instruction

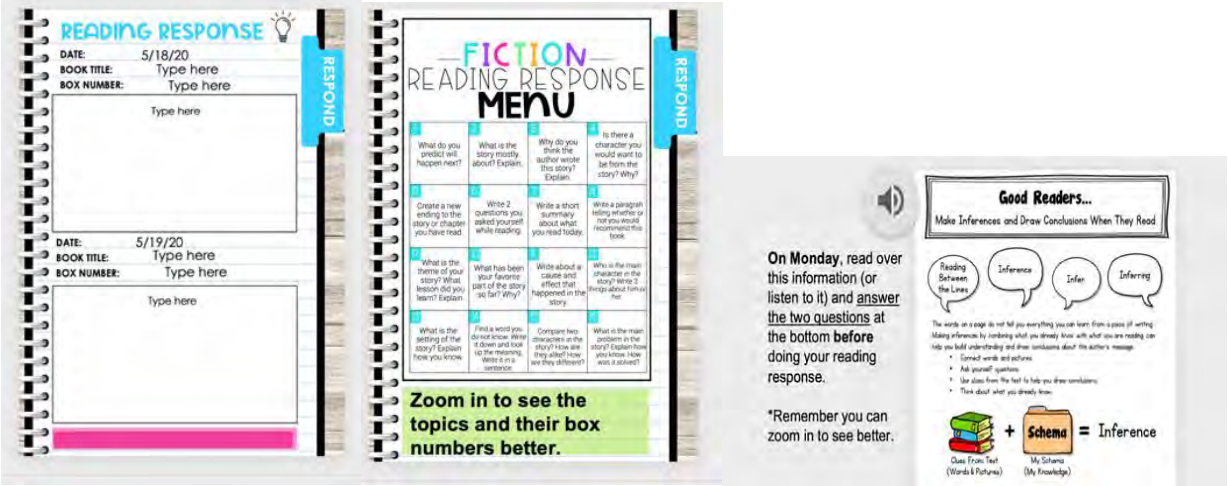
TPK was the second most frequent (18.79%) coded TPACK domain. Though participants demonstrated TPK frequently, results of the survey revealed that overall (M = 3.72) they were not as confident in this domain compared to other domains. However, when examining the survey results individually, results were mixed in the participants perceived ability in the TPK domain. For instance, Kelly noted high perceived ability in the TPK domain with a mean score that was the highest at 4.75 and she shared numerous (n =19) instructional examples that aligned with the TPK domain. Tamara (4.75) and Cecile (4.5) also showed high perceived ability in TPK, but qualitative analysis revealed few demonstrated instances of TPK (Cecile n = 0; Tamara n = 1). On the other hand, Leah did not feel confident about her TPK ability (M = 2.75), but she exhibited the second greatest number of TPK instances (n = 9). This shows that even though Leah did not feel confident about integrating technology and pedagogy during literacy instruction, she still made an effort to do so.

After analyzing the qualitative data, it was apparent that participants used technology to transform or enhance their pedagogical practices, including scaffolds, instructional videos, direct instruction, modeling, and instructional examples. To enhance these instructional practices, participants used various technology tools and resources. Many participants used the Google Suite tools such as Slides, Docs, Forms, Meet, and Classroom. Those participants not using Meet for synchronous meetings used either Zoom or Teams, depending on both preference or school policy. For read-alouds and independent reading, participants used resources such as Raz-Kids, EPIC!, or YouTube. Some participants recorded themselves reading text for asynchronous read-alouds. Fewer participants used more advanced tools and platforms to enhance their pedagogical practices, such as Jamboard, Gynzy, and EdPuzzle.

Scaffolded Instruction. Participants utilized technology to scaffold their instruction. Participants made fill-in worksheets, templates, and graphic organizers. For instance, Leah created word study workbook pages with built-in scaffolds (i.e., word banks and images) using Google Forms. Kelly, using Google Slides, created weekly "digital reading notebooks with prompts specific to the

teaching points. As students read and attempt the day's work, they complete a prompt." Embedded within these digital notebook templates were reminders that served as scaffolds for her students. Figure 9 illustrates an example of Kelly's digital notebooks.

Figure 9
Scaffolded Digital Notebooks Work Sample

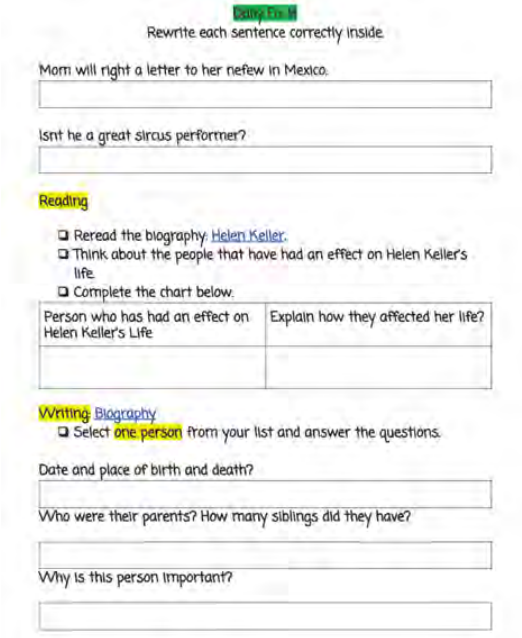


Leah also used Google Slides to scaffold her writing instruction for students. Leah made a Google Slides template for students to serve as a graphic organizer to guide them through the writing process. She provided a rationale for this decision by noting,

> I chose Google Slides because each slide is used for a new paragraph, and it works as a built-in graphic organizer. After watching my lessons, students go into their Google Slides presentation and apply what they learned into their own writing.

Furthermore, Mia created a scaffolded template using Docs (See Figure 10). She made a template where students could complete their literacy work. The template included a checklist to keep students on track, a chart to organize a reading response, and links to further resources or information.

Figure 10
Scaffolded Template Work Sample



Video Usage. Most participants used videos in some form during their instruction. These videos included ones found on the web or videos they created themselves. Those videos made by participants served the purpose of direct instruction. Mia tended to use videos found on the web to help build students' background knowledge during reading and writing instruction, noting, "This was extremely helpful for my native (Spanish) speakers." Kelly used both types of videos. She would regularly incorporate " online sources" and create videos weekly using Screencastify and Screencast-o-Matic to teach literacy content, which she found "extremely useful in creating video content for students." Kelly also found that she and her teammates had to be purposeful and targeted when creating asynchronous videos. She noted, "Our goal is to explain the lesson as clearly as possible to minimize questions and confusion, so we've definitely simplified things a bit from what we'd be doing in the classroom."

Leah used videos the most to enhance her literacy instruction. Daily, she created videos of her reading one chapter of the class novel with corresponding comprehension questions in the discussion forum on Google Classroom. Leah also used videos for students to have exposure to mentor texts. In writing to inspire students, she shared read-alouds of mentor texts found on SafeYouTube. She further used mentor texts in self-recorded videos where she provided direct instruction. Leah elaborated, "For Reading and Writing, students are still receiving direct instruction with recorded mini-lessons with authentic mentor texts and explicit, focused objectives." In word study, Leah recorded bi-weekly direct instruction lessons using Google Slides and Screencastify. Perhaps Leah's most advanced use of video occurred through EdPuzzle. The platform, EdPuzzle, allowed Leah to make her videos interactive, which helped her gauge her student' comprehension. She describes her use of this platform by noting, "Edpuzzle allows me to embed multiple-choice or open-ended questions as the video plays, which helps me gauge the students' understanding."

Modeling and Giving Examples. Participants found ways to model and give instructional examples through technology. For instance, through images and text, Aliana used Gynzy to model letter formation and the butterfly's life cycle. Cecile provided modeled fluent reading using recorded read-alouds on Seesaw before students recorded themselves. Claire used PDF files and the tools provided by Adobe Acrobat to model annotating text. Kelly ensured to share examples "of the work we'd like them to try independently" in the Google Slides used to review the daily literacy teaching point and work. Leah also used Google Slides to model strategies instead. Leah used Google Slides and recorded herself using Screencastify to "model the day's skill or strategy." Mia found the best way to share examples of particular literacy assignments was through Jamboard. She liked that this tool allowed her "the ability to insert images, sticky notes, and use "markers" to leave notes."

4.2. Challenges of Implementing Virtual Literacy Instruction

The next theme addressed is the challenges of implementing virtual literacy instruction. The pandemic presented many challenges for educators teaching literacy to elementary students. Qualitative analysis revealed that some of these challenges were related to teaching strategies such as giving feedback and monitoring progress. Other challenges were student engagement, time constraints, and district mandates. Teachers found it difficult to use formative assessment and differentiation during instruction due to the nature of virtual learning, which negatively affected students with the greatest needs. Responses in the survey reflected the challenges the participants faced. Specifically, participants did not feel highly confident in their "ability to meet the overall demands of online teaching in literacy" (M = 3.67).

4.2.1. Difficulties in giving feedback and lack of accountability in its application

Participants noted the difficulties of finding student-friendly methods of providing feedback on student writing. Participants also noted challenges in students applying their feedback during the revision process. For instance, Ava provided a choice for how students wanted to share their

written work to receive feedback. Students could either email her a document or send her images of the completed writing assignment. The images made it difficult for Ava to provide feedback on the writing documents compared to shared document files. Ava stated:

> For the students who sent their writing assignments via email, in all honesty, which was just one student, this student would share the document with me via email, in which I was able to make corrections and give valuable feedback that the student could see. It was much easier doing this, unlike my other students sending me pictures of their completed writing assignments. It's just unfortunate because it basically was just a way for students to get credit for it. Unlike if we were in the classroom, I would be conferencing with my students about their writing and going over it with them step by step. Virtually, this was not the case.

Jaime and Kelly both successfully provided feedback using the comment feature in Google Docs, but their challenge was getting students to apply the feedback. Jaime wrote, "I will post feedback and return the assignments, but then it is left at that. Either the students do not know how to read their posts or ignore them." Similarly, Kelly wrote, "I leave them feedback each day and make suggestions for ways to improve. However, some students do not follow the suggestions or read the comments."

The comments made by Jaime, Ava, and Kelly also reflect the lack of engagement in the writing revision process in the virtual setting. In Ava's case, students were more interested in receiving credit than improving their writing. Both Jaime and Kelly felt their students ignored their comments. Ava's comment further alludes to the absence of virtual writing conferences.

4.2.2. Difficulties in holding writing conferences due to time and district mandates

Participants noted the difficulties of holding virtual writing conferences. Ava held conferences with students and reviewed their writing in detail in person before the pandemic. Ava was not the only participant who had difficulty holding writing conferences. Many participants were only allowed to provide instruction asynchronously due to mandates by their school districts, and synchronous instruction was designated for emotional well-being check-ins.

Though most participants did not hold virtual writing conferences, one participant attempted to hold them, but with some challenges. For instance, Kelly held writing conferences individually and in small groups, and to ensure implementation, she created a schedule. However, she noted that writing conferences were less frequent and shorter in duration than in-person learning. Kelly noted:

> I've created a schedule where I have a set time to conference and meet with each child throughout the week. Conferences are only ten minutes, though, because there's just simply not enough time! Yes, I am trying to conference with them regularly, but they're certainly not as frequent and regular as they were in the classroom. In the classroom, I could meet with several students during a class period, and conferences could be varying lengths of time. I think my reading and writing conferences have decreased a bit because I'm not with them as they're reading and writing anymore.

4.2.3. Difficulties in implementing formative assessment and improving student outcomes

Participants noted the difficulty of implementing formative assessment during virtual learning. Kelly stated that her writing conferences were typically guided by formative assessment (i.e., observation). She mentioned that she still attempted to implement this practice, but it was difficult in the virtual environment. Kelly said:

> So much of conferencing and small groups in the classroom are dictated by informal observation. I feel that that component is missing greatly in this style of teaching. I am unable to informally observe them daily or offer little tips as they work. However, I'm trying!

Kelly's challenge of using formative data to inform instruction was reflected by participants' responses in the survey. Specifically, participants did not feel the highly confident in their "ability to use online student assessment to modify instruction in literacy" (M = 3.56) and their "ability to adjust teaching methodology based on student performance/feedback" (M = 3.8) both important aspects of formative assessment.

Claire also noted that she could no longer provide immediate error correction to her students in the virtual environment. This type of formative assessment is key to improved student outcomes. Claire went on to say that she felt that virtual learning was negatively affecting student outcomes. She asserted, "I don't think the instruction is 'closing the gap.' In fact, the DIBELS progress monitoring tells me the opposite information; they are losing ground – so that is very unmotivating for me." Additionally, Ava voiced her concerns regarding student learning outcomes. She felt that virtual learning did not promote literacy growth in her students. Ava wrote, "I really think that this (virtual learning) impacted student learning, especially students who are special ed. because I feel like they missed out on their services that are outlined in their IEP." This theme was also supported by results of the survey. Participants did not feel highly confident in their "ability to create an online environment which allows students to build new knowledge and skills in literacy" (M = 3.56). In other words, participants did not feel highly confident in their ability creating an online learning where students learn literacy content and skills.

4.2.4. Difficulties in transferring instructional approaches for students with greatest needs

Claire and Ava taught students with the greatest needs, with Ava being a special education teacher and Claire a reading specialist. It became apparent that there were challenges in transferring certain instructional approaches for students with the greatest needs to the virtual setting. Both Ava and Claire were aware of these challenges and were not highly confident in their ability of using different instructional approaches in the online environment liked they used in the face-to-face setting. Specifically, both Ava (2.0) and Claire (3.0) rated themselves the lowest on the survey in their "ability to implement different methods of teaching literacy online." Though the reasons are multi-faceted for the difficulties of transferring instructional approaches to the online environment, one possible explanation could be the difficulty of providing instruction for non-verbal students or instruction dependent on explicit and direct principles, such as the structured approach. For instance, some of Ava's students were nonverbal, resulting in reduced participation because students did not have their AAC devices at home, or receptively participating was near impossible in the online environment. Ava noted:

> Something I have noticed since I have some nonverbal students is they do not have their communication devices (AAC), so they can't expressively participate to answer some questions about the stories. It is hard to do receptive teaching online. I can't have my nonverbal students learn receptively, meaning they can't touch the characters in the pictures when I teach online.

Claire and Tamara, reading specialists, and Ava, a special education teacher, utilized a multi-sensory structured instructional approach to reading called Orton-Gillingham (OG). This approach utilizes a clear instructional sequence with embedded multisensory aspects that should take approximately 40 minutes to one hour and is typically used with children with learning disabilities, such as dyslexia. Claire noted that she had difficulties finding ways to incorporate the multisensory parts of the OG lessons. Tamara and Ava commented on the limited time for synchronous instruction to fit an entire OG lesson. Ava wrote that she only had 30 minutes for multisensory reading instruction (OG) and stated that "it still did not feel like enough." Tamara noted that she had to eliminate aspects of the OG sequences. She said, "Because of the 20-30 minutes (of synchronous instruction), I could not do blending; instead, I taught the lesson and practiced encoding by having my students say the new word, spell it, and to creatively give me a sentence." There seemed to be insufficient time for a teacher-directed and structured reading lesson with explicit instruction.

4.2.5. Difficulties in monitoring student learning

The feasibility of monitoring student learning made participants question the validity of student learning. Participants wondered how much assistance students received from caregivers at home and how much work was independently completed. Leah stated:

> It is hard to tell what a student actually knows and can do independently because I do not know how much assistance they are getting at home, and I do not have the ability to observe them as readers and writers while offering feedback and coaching.

Similarly, Jaime wrote, "The work shows that students are understanding the concepts. I do also wonder how much assistance the parents are providing. It is harder to assess if students are truly able to do certain work on their own. "

Part of reading instruction is giving time for students to practice and read independently. However, participants noted difficulty monitoring student reading and holding students accountable during virtual instruction. Kelly confirmed the challenges of independent reading time during virtual instruction. She wrote, "The struggle with virtual instruction is that it's harder to monitor their independent reading. I worry that some students aren't spending enough time with a book in their hands." Similarly, Cecile mentioned:

> In the classroom, you can be more accountable for the students' independent reading time. However, I am finding it a challenge to have students submit the recordings of readings. I am trying to brainstorm other ways to motivate them to want to record themselves while reading. The purpose of the recordings is to use them as running records to assess.

Cecile's concluding comment highlighted the difficulties of conducting running records due to student motivation in wanting to record themselves. However, participants noted in the survey other difficulties related to one purpose of running records. Running records are a mainstay practice in elementary level classrooms that allow educators to determine students' reading levels and reading abilities such as what problem-solving strategies their students use to decode unknown words during reading. Participants noted lower confidence in their "ability to distinguish between correct and incorrect problem-solving attempts by students" (M = 3.8). The survey results and Cecile's comment reflect the difficulty of monitoring students' independent reading. Cecile's comment also highlights the challenge of motivating and engaging students in the virtual environment, discussed in the next section.

4.2.6. Motivating students to produce quality work and to engage in and attend synchronous lessons

Participants noted the challenge of motivating students to produce quality work and not rushing through their work. For instance, Kelly wrote:

> Students that are not especially motivated are struggling a bit. Some of them are producing low quality work, not just out of confusion, but out of a desire to rush through the work. It's a challenge to make sure that student work is at the same quality that we'd expect in the classroom.

Similarly, other participants noticed students rushing through work or not doing it. Jaime stated, "There are a few (students) that are either not doing any of the literacy work or are quickly rushing through the assignment." Kelly wrote that some students are doing the "bare minimum," and she noticed that one pattern is that "the written work in reading on the response forms has been minimal and I can sense that students are just trying to get it done." In other instances, students completed assignments without even reviewing the lesson materials. For example, Kelly discovered that "some students are submitting their poetry reading responses first thing in the morning before even watching the lesson."

Participants working with younger students found it hard to keep students focused and engaged during synchronous instruction. Cecile, a kindergarten teacher, found it difficult "keeping the students engaged and focused during the online learning while learning in their home environment." Cecile's comment reflects the distractions that may have been present in students' homes. Claire, a reading specialist working with children in K-4, noted difficulty during

assessments. She stated, "The younger kids seem to be an issue that I'm having trouble assessing, they really seem bored sometimes. Further, Aliana wrote:

> Sometimes my students need constant redirection and if they are in an online group lesson, I don't want to signal any children out as opposed to if we are in a classroom, I can position myself to sit directly close or in front of them to gain their attention.

Aliana's comment reflects a difference between virtual and face-to-face instruction. Face-to-face instruction allows teachers to discreetly (low profile) re-focus students' attention. On the other hand, re-focusing students' attention on the virtual environment may target students, leading to unnecessary negative attention.

Students' lack of engagement and motivation was also reflected in their attendance in synchronous meetings or Google Classroom log-in times. For instance, Mia noted, "Student motivation towards learning has definitely been affected. I have students who do not log on to Google Classroom until 1:00 PM." Further, Tamara and Ava said many students did not attend their synchronous lesson. Tamara observed that "attendance was about 50%" during synchronous classes. Ava found that participation was high during the early days of virtual learning. Still, as the days progressed and student motivation waned, attendance declined, and students did not join the live lessons. Ava said, "At the beginning of remote learning, they would attend more frequently, but towards the middle and end, they did not. I did not pressure these students to attend." Ava's comment about not pressuring students to attend may be related to most district policies during the pandemic. At this time in the pandemic, school districts were not making attendance of synchronous sessions mandatory as would become the norm during the 2020-2021 school year. Though district policy and low motivation contributed to low attendance during synchronous sessions, technology access may have played a role.

4.2.7. Lack of technology access, resources, and skills

Participants reported difficulty due to a lack of technology access and resources. For instance, Jaime indicated that "in the beginning it was hard because there was confusion and lack of resources such as physical copies of work, Wi-Fi and/or computers." Mia expressed the difficulty of access to technology if there was more than one student in the household. She noted:

> Google Meet is not mandatory in our district because not all students have their own Chromebook. If there are 3 siblings living in the same apartment/house, they will only be provided with 1 Chromebook that they have to share. This makes it a lot more difficult for students to join Google Meet at certain times.

Claire wrote, "I have two students who have not been able to log on daily due to home situations and access to technology." Similarly, Leah noted that some students would miss live lessons that addressed any misconceptions in learning due to these students not being able to get online until the evening hours.

Besides technology access, participants also discussed that technology functionality and the students' technology skills were challenges of virtual learning. Often students had difficulty with dead links or accessing these links. For instance, Tamara said, "Often my students would have technology failure where they couldn't hear me or just having technical difficulties with the Google link." Mia further noted that students did not complete reading entire articles or texts because the "hyperlink failed to log into their Kids A-Z or Newsela account." Survey results revealed that participants did not feel very confident in their ability to assist students when difficulties in technology functionality occurred. The lowest mean score (M = 3.11) occurred on the survey statement, "my ability to assist students with troubleshooting technical problems with their personal computers."

Participants teaching in the early grades indicated the difficulty of these students navigating technology programs and learning to use technology tools. Students needed instruction in technology before accessing the content related to literacy. Cecile, a kindergarten teacher, stated:

> My students are also in kindergarten so a lot of them also had to get adjusted using a computer and the digital platforms. Some students do not know how to log into Raz- Kids while being logged in Zoom. Therefore, this takes from instruction for figuring out how to log in.

Claire, a reading specialist for grades K-4, mentioned that the younger students (i.e., 2nd grade) can now use technology tools after a few months of virtual learning; however, "it is not an automatic skill," and these students during class receive "frequent reminders and breaks."

4.3. Successes of Virtual Literacy Instruction

Challenges were expected during the abrupt pivot to virtual instruction in the spring of 2020. However, the analysis revealed that there were successes as well. For instance, participants ensured that the emotional well-being of the students was at the forefront of their instruction. Another theme that emerged was participant increased collaboration, with participants collaborating more than before the COVID-19 pandemic. Participants were also willing to apply what they learned during virtual instruction to future practice.

4.3.1. Attending to student emotional well-being

School districts varied in the extent that synchronous online meetings were held. Early on in the pandemic, attendance during these synchronous meetings was not required due to a lack of 1:1 device availability, access to the internet, and availability of supervision by caregivers. Thus, for the most part, synchronous meetings were not used for academic content. The one exception to this was instruction for students with special education needs, where synchronous meetings were held to fulfill the stipulations in the students' IEPs. Typically, when academic content was covered, it was through pre-recorded instructional videos or the completion of work packets. However, districts at the time encouraged synchronous meetings to check in on the social and emotional well-being of the students. Leah noted:

> The district has been strongly encouraging the use of Zoom and other platforms (most recently they added Google Meets to our toolbox) for check-ins so the students can see their teacher and each other and have some level of interaction. They are strongly encouraging us to use these video-conferencing tools in order to address social-emotional needs.

Leah went on to discuss that students were happy to see each other and discuss what was going on in their lives. She stated, "When I use Zoom for social check-ins (once or twice a week), the students who participate are happy to see each other and enjoy sharing what is going on in their lives with each other." Leah was considered an expert for using Zoom meetings for check-ins in her school district and was asked to conduct a PD on this topic. Leah was further aware of her expertise in the use of Zoom. This was confirmed on the survey, where Leah rated herself high (5.0) on her "ability to use various courseware programs to deliver literacy instruction (e.g., Google Classroom, Zoom, etc.)." Kelly additionally ensured that she held Zoom check-ins with her students where they "chat about books and schoolwork, but I also use this time to check in with how they're doing emotionally/mentally."

When Mia checked in with her students, she praised them for the great work they were accomplishing. Her students were concerned that the shift to online learning, which was not the same as face-to-face learning, wouldn't prepare them for the next grade. Mia wrote:

> My students still tell me that learning from home is not the same as learning in school but, I remind them every day that they are doing a great job and that they are ready for fourth grade! They love to hear that.

Tamara went beyond checking in with her students during the synchronous sessions. She used a therapy dog to reward and support her students' emotional well-being. Tamara noted:

> I will reward my students for their hard work with a visit from my emotional support dog "Buddy." Buddy is indeed a real dog. He is a full Shih -Tzu and just recently as certified as an emotional support dog.

It was clear that participants were aware of the possible adverse side effects of the emerging pandemic on students' emotional well-being. They made every effort to check in with students, encourage them, and provide support.

4.3.2. Expanded collaboration to support colleagues

The pivot to online learning was challenging for the teachers, and many participants spent more time prepping instructional materials and lessons than usual. Six of the nine participants noted that they spent extensive or more time preparing for their virtual instruction. To help counteract this increased planning and preparation time, many participants and their colleagues collaborated to create lessons and materials. This collaboration was particularly true for those participants teaching in the general education classroom. Those participants in the role of special educator or reading specialist were less likely to mention the collaborative planning. For instance, Kelly, a fourth-grade general educator, noted:

> My grade level team and I decided to departmentalize in an effort to best support the students and to help us manage the workload. I am in charge of Reading and my three teammates cover Writing, Math, and Science/Social Studies.

The ability to plan literacy lesson plans effectively takes strong content knowledge and this ability was reflected in the survey results. Participants felt confident about their CK (M = 4.11). Further, participants felt highly confident about their TCK (M = 4.22) which is needed for educators to plan effective literacy lessons in the online environment.

Other districts relied on the expertise of specialists to help with general education planning. For instance, Leah, a third-grade general educator, collaborated with the reading specialists. She wrote, "Our Reading Specialist has offered to make one lesson per week for each grade level. We asked her to make fluency and comprehension lessons within the poetry genre." Jaime, a second-grade general educator, noted that the "ELA coaches have come up with the [student work] packets" and the "Google slides/documents." Jaime's role was to "assist students who are confused or do not understand the matter." Though not directly related to creating classroom materials, Leah found herself collaborating with and supporting her colleagues by offering PD. Leah stated, "I have been able to support my coworkers and grade-level team with different programs and applications to make this somewhat easier." Participants seemed to recognize the need to collaborate during the pandemic to support their students and help make the workload more manageable.

4.3.3. Willingness to change future literacy instructional practice

Participants were willing to change future face-to-face instruction based on what they learned during virtual instruction. Claire felt the success of virtual learning was simply "learning all new ways of delivering instruction." Participants were especially willing to incorporate more technology into their instruction. Aliana noted that she planned on "using Gynzy more in my lessons." Jaimie and Mia planned on using Google Classroom more often in their instruction. Mia explained further that in addition to using Google Classroom for students to complete tasks, she was planning on continuing to use more "non-print materials, such as "Kids A-Z, Newsela, and EPIC" and other platforms like "Flipgrid, Studyladder and SeeSaw" during learning centers.

Kelly, who used Google Classroom extensively before the pandemic and worked in a 1:1 district, was more specific in her plans. She wrote:

> I have begun to think about how my instruction might change when things return to normal. I like the idea of having students work in a digital writing notebook. It's been much easier to provide feedback and their work is neater and more organized. And I feel I've been able to monitor their writing more as it's digital.

Tamara found that using an iPad "opened my eyes to using technology for my reluctant writer." Using the iPad allowed her student to write more, something she struggled with prior to the pandemic, and she looked forward to letting him use the iPad next year. Mia also noted that technology helped students during the pandemic and planned to continue using certain practices.

Specifically, Mia stated that she planned on continuing to use the "speech-to-text feature on Google Docs in the upcoming school year, that way my ELLs can use this to help them complete tasks using verbal responses." Jaime further recognized how technology could help her struggling students. She felt she could continue using videos to support students in learning the daily content. Jamie wrote, "I also like the idea of having a YouTube channel for my students filled with resources such as me explaining the topic or lesson of the day."

On the other hand, Cecile focused on improving the content of her literacy lessons. She stated:

> I will change my literacy instruction in the upcoming school year by integrating the poem components for strengthening the student's fluency. Just from virtual instruction, I saw great progress in the students rhyming and fluency. I am curious to see the results in person for this.

Aliana did not focus on the integration of technology either. She began using whiteboards during virtual instruction and found that they were easy tools to use during virtual instruction for formative assessment. She looked forward to using them when education returned to face-to-face. Aliana articulated, "I will also be using white boards a lot, especially the ones that have the lines on them. You really can do so much with them when it comes to formative assessments and writing."

5. Discussion

This study primarily explored how elementary educators exhibit TPACK in their virtual literacy instruction during the early days of the COVID-19 pandemic (RQ1). TPACK was the most frequently coded domain among participants. This finding contradicts the research of Anderson and Putman (2019), who reported teachers' statements more often reflected TK and TPK with fewer assertations devoted to TPACK. The different methods of coding could explain this contradictory finding. In this study, participant lesson materials were coded, while in the Anderson and Putman study, observations were used only to clarify interview data, thus, resulting in more TPACK codes.

TPACK was apparent across the participants' reading, writing, and phonics instruction; however, it varied in complexity. TPACK was more complex in the participants' reading and writing instruction than phonics instruction. The different TPACK complexities may result from the nature of phonics instruction. Pedagogically, phonics instruction usually occurs through direct and explicit instruction, which can occur more easily during synchronous virtual meetings. Similarly, Crosson and Silverman (2022) discovered that educators found code-focused skills were more feasible to implement virtually than in other literacy areas. The complex use of technology is not necessarily needed in virtual phonics instruction. In the case of this study, the use of video conference software was sufficient in allowing the participants to meet their intended phonics instructional objectives.

On the other hand, content and instruction related to writing and reading are more complex and multifaceted. Participants were more likely to use more pedagogical practices and technology to meet their instructional objectives and the needs of their students. Compared to their phonics instruction, participants were more like to use platforms in addition to Google Suite, such as Flipgrid, Gynzy, Seesaw, and edPuzzle. When using Google Suite in their reading and writing instruction, participants were more likely to use more advanced features. These results align with the research of Taimur et al. (2021). They found that teachers were willing to add additional pedagogical strategies and various technology platforms to meet the needs of their students.

After TPACK, TPK was the most frequently occurring coded domain. This finding aligns with other research that found a high percentage of teachers using TPK (Anderson et al., 2017; Anderson & Putman, 2020; Hughes & Scharber, 2008; Hofer & Grandgenett, 2012; Özgün -Koca et al., 2011). Even though TPK was coded frequently, participants did not rate themselves as having the highest confidence in this area (M = 3.75). However, this high frequency illustrates that even though participants did not feel highly confident about their ability to integrate technology and pedagogy during literacy instruction, they still made an effort to do so. For instance, participants

used technology to enhance their pedagogical practices like scaffolding, modeling, giving examples, and direct instruction. Mainly using Google Suite, participants provided scaffolds and supported student learning by creating templates, worksheets with support, and graphic organizers. To execute direct instruction or build student background knowledge, participants created videos or found videos on the Internet, which is similar to the findings of An et al. (2021). The participants also used technology, such as Jamboard, Seesaw, Gynzy, and the annotation tools on Adobe Acrobat, to share examples and provide modeling. Other research confirms these findings on what type of technology or learning management system teachers use predominately in instruction. Teachers in this research primarily used the Google Suite, which was accessed through Google Classroom. Similarly, both An et al. (2021) and Francom et al. (2021) found that educators' primary learning management system was Google classroom. Similar to the findings of this study, An et al. (2021) also found that educators used videos to facilitate learning, but the researchers did not elaborate on how the teachers used the technology to facilitate learning, which makes this research unique because it explored how teachers used technology during virtual literacy instruction

This study further explored how educators perceived their TPACK and how these perceptions compared to practice (RQ2). Participants rated themselves the highest under the TCK, PCK, CK, and PK domains. Participants were the least confident in the TK and TPK domains. Except for high ratings of the TCK domain, these results mirror the research of Archambault and Crippen (2009). They also found that the educators rated themselves the highest in PK, CK, and PCK but were not confident in the technology domains. Participants were most confident in delivering literacy instruction using courseware programs such as Google Classroom and Zoom and the least confident in their ability to assist students with troubleshooting technical problems with their personal computers. Participants' perceptions had the greatest variability across the TK domain, and participants' perceptions were the most similar in the PCK domain. The greatest relationship between perceived ability and demonstration of TPACK occurred in the TPACK domain, with a more subtle relationship occurring in the PK and PCK domains. These results contradict the research of Backfisch et al. (2020), who found no relationship between educators' self-reported TPACK and technology integration in lesson plans. Anderson and Putman (2019) found no relationship between teachers who felt confident in technology integration and the number of data excerpts related to TPACK. It is unclear as to the cause of the contradictory results, but an educator's TPACK varies depending on contextual and other factors (Brantley-Dias & Ertmer, 2013; Cheng & Xie, 2018; Koehler et al., 2013; Niess, 2011). Both Backfisch et al. (2020) and Anderson and Putman's (2019) study contexts (i.e., content area, traditional face-to-face instruction, study sample) differed from ours, which could account for the differences.

The final purpose was to identify the challenges and successes of virtual literacy instruction during the first few months of the COVID-19 pandemic (RQ3). Participants were aware of these challenges and survey results revealed that they did not feel highly confident in their abilities meeting the demands required for teaching literacy virtually (M = 3.67). Many of the challenges identified aligned with trends found in recent COVID-related research, such as student technology access and skills (An et al., 2021; Ogodo et al., 2021; Taimur et al., 2021; Schleicher, 2020; Steed & Leech, 2021; Walker-Dalhouse & Risko, 2020), student motivation and engagement (An et al., 2021; DeCoito & Estaiteyeh, 2022; Eadens et al., 2022; Francom et al., 2021; Taimur et al., 2021), and student learning and accountability (Doll et al., 2021; Locke et al., 2021; Marshall et al., 2020; Steed & Leech, 2021). In the study survey, participants did not note high ability in their use of formative assessment to inform literacy instruction. The challenges of formative assessment during the pandemic aligned with other researchers' findings (Francom et al., 2021), but the implementation of writing conferences and feedback were unique and contribute to virtual writing instruction research. Participants struggled the most with findings ways to provide feedback on student writing that students would use to revise their written work and how to hold effective virtual writing conferences. Writing conferences are often based on formative assessments, which were

difficult to implement during virtual learning. The fluidity of on-the-spot writing instruction in traditional classrooms was missing in the virtual environment. Typically, teachers move through the classroom and monitor student writing, in which they often pull students aside for impromptu writing conferences. This on-the-spot instruction could not be replicated in the virtual environment by participants, and participants had difficulty implementing effective conferences.

This study also explored successful literacy instructional practices. Like other educators (Chamberlain et al., 2020; Correia, 2020; Doll et al., 2021; Taimur et al., 2021), participants were worried about the emotional well-being of their students due to the COVID-19 pandemic, and they made a conscious effort to check-in and speak with their students regularly. One participant even utilized a therapy dog to address her students' emotional well-being. Many participants found that they were spending more time planning and creating digital lessons and materials, similar to other findings (An et al., 2021; DeCoito & Estaiteyeh, 2022; Francom et al., 2021; Steed & Leech, 2021). To help counteract this increased planning and preparation time, many participants and their colleagues collaborated to create lessons and materials. Other educators, too, felt collaboration was beneficial (Doll et al., 2021) and had more feelings of success during the pandemic when given the opportunity to purposively collaborate with colleagues (Kraft et al., 2020). Participants also planned to use what they learned during virtual instruction to improve their future practice. Participants planned on using the digital tools they used in virtual instruction to enhance their future face-to-face instruction, similar to the findings of Francom et al. (2021), where teachers wanted to continue to use online teaching practices and tools they used during the pandemic. This last finding is hopeful because it alludes to the idea that though a difficult time, educators are willing to learn from this experience and use this knowledge to improve future instructional practices.

5.1. Limitations and Future Research

There are limitations to the study to recognize that impact the generalization and trustworthiness of the results. For instance, the sample size was small, and the participants were limited to educators teaching in grades K-4 in one state in the northeast, impacting the generalization of the results. It is recommended that research on educators' literacy practices and TPACK during virtual learning be extended to other grade levels such as high school and middle school. Even though the study used various data sources to help improve the trustworthiness of the data, the results were based on self-reported data. Self-reported TPACK may not be a valid tool to measure educators' technology usage (Schmid et al., 2021). Email interviews were implemented due to the feelings that teachers were feeling Zoom fatigued, stressed, and overextended due to the pandemic. Email interviews allowed the participants to respond at a time convenient to their schedule. Though follow-up questions were utilized through email, face-to-face interviews (i.e., via Zoom) would most likely result in a more in-depth recall of literacy practices and a more natural way to ask follow-up questions. Observation of the educators' virtual literacy instruction would have been beneficial, but it was impossible to do so due to the COVID-19 pandemic. Additional research should include teacher observations to understand further the role of TPACK in educators' virtual literacy instruction.

There is a dearth of research related to TPACK and virtual literacy instruction before and during the COVID-19 pandemic. In this study, it was discovered that the level of TPACK varied based on the content area of literacy (i.e., phonics, reading, writing). Further research is recommended to explore this finding and how TPACK influences instruction across literacy domains. Participants noted that virtual instruction negatively affected student outcomes and that it was difficult to hold students accountable. Because this data was self-reported, the accuracy cannot be determined, but it has value. Currently, much of the research focuses on the effectiveness of virtual learning in higher education rather than the context of P-12 education (Arnesen et al., 2019). The effectiveness of virtual learning on student outcomes is unclear (Viner et al., 2020); especially for what literacy outcomes are impacted the greatest (Domingue et al., 2021)

Further research should be conducted that examines the effectiveness of virtual instruction on student literacy outcomes. Knowing the impact on student outcomes is important to know to determine if the use of virtual instruction can be a viable and validated instructional model.

5.2. Recommendations for Practice

The following suggestions are policy recommendations for improved practice.

- It is recommended that school districts implement digital learning days to help prepare students and teachers for shifts to virtual instruction (Marshall et al., 2020). Digital learning days will allow educators and students to be ready for emergency school closures due to weather, natural disasters, sickness, or other emergencies. Along with digital learning days, educators should be provided with PD on the best practices of effective virtual literacy instruction (An et al., 2021), especially to prepare for future school closures due to emergencies.
- During the early months of the pandemic, there were limited or nonsexist school policies regarding how to implement virtual emergency instruction. It is recommended that schools establish explicit guidelines for teachers and students for remote learning. Clear directives should be articulated regarding expectations for educators' instruction and assessment and student accountability.
- Participants noted the challenge of technology access for their students. It is recommended that school districts ensure that all students have access to devices and the Internet. At this time, 1:1 technology should have an alternative means of Internet access available (i.e., hotspots). These policies can work toward eliminating the digital divide that widened during the pandemic.

The following recommendations pertain to improved instructional practice in literacy.

- Participants noted difficulties with student engagement during virtual instruction. It is recommended teachers implement practices such as goal setting, student collaboration, visual schedules, and clear expectations to help improve engagement.
- Giving feedback and holding conferences, especially in writing, was challenging for participants. It is recommended that teachers use programs such as Seesaw to provide student feedback on writing pieces. Students can upload work, and teachers can give feedback via voice, text, or pen. To encourage student implementation of feedback, it is suggested that teachers guide students to set personal writing goals during the writing process. At the same time, it is recommended that educators set clear and explicit expectations regarding how students should apply feedback. Educators can use breakout rooms to hold writing conferences in small groups or individually. Breakout rooms can also be utilized for peer conferencing.
- To monitor progress and hold students accountable for reading, it is recommended that teachers use programs where students can record themselves reading and receive teacher feedback. Teachers can consider using programs such as Flipgrid, Seesaw, or VoiceThread. Literably is another resource educators may consider adopting. This resource administers and scores running records and helps track student progress.

5.3. Conclusion

The closure of schools in March 2020 due to the COVID-19 pandemic caused educators worldwide to pivot to virtual instruction without much training or preparation. Like other teachers, the study participants were challenged to implement quality literacy instruction facing difficulties, such as student technology access and skills, student motivation and engagement, and student learning and accountability. Challenges notwithstanding, the educators found ways to engage and motivate students and collaborate with colleagues to help lessen the burden of planning and preparing virtual instruction. Understanding the challenges and the successes of virtual literacy instruction can inform professional development and future digital learning days. This research further broadens the understanding of the role of TPACK in virtual literacy instruction by providing examples of how elementary educators exhibit TPACK in their instruction. However, findings

revealed the varying complexities of TPACK integration across literacy domains, and further research is needed to understand these complexities fully.

Author contributions: All authors have sufficiently contributed to the study, and agreed with the results and conclusions.

Funding: No funding source is reported for this study.

Declaration of interest: No conflict of interest is declared by author.

References

Affouneh, S., Salha, S., & Khlaif, Z. (2020). Designing quality e-learning environments for emergency remote teaching in coronavirus crisis. *Interdisciplinary Journal of Virtual Learning in Medical Sciences (Online)*, *11*(2), 135-137. https://doi.org/10.30476/ijvlms.2020.86120.1033

An, Y., Kaplan-Rakowski, R., Yang, J., Conan, J., Kinard, W., & Daughrity, L. (2021). Examining K-12 teachers' feelings, experiences, and perspectives regarding online teaching during the early stage of the COVID-19 pandemic. *Educational Technology Research and Development*, *69*(5), 2589-2613. https://doi.org/10.1007/s11423-021-10008-5

Anderson, S., Griffith, R., & Crawford, L. (2017). TPACK in special education: Preservice teacher decision making while integrating iPads into instruction. *Contemporary Issues in Technology and Teacher Education, 17*(1), 97-127. https://www.learntechlib.org/p/173323

Anderson, S. E., & Putman, R. S. (2020). Special education teachers' experience, confidence, beliefs, and knowledge about integrating technology. *Journal of Special Education Technology*, *35*(1), 37-50. https://doi.org/10.1177/0162643419836409

Archambault, L., & Crippen, K. (2009). Examining TPACK among K-12 online distance educators in the United States. *Contemporary Issues in Technology and Teacher Education*, *9*(1), 71-88. https://citejournal.org/volume-9/issue-1-09/general/examining-tpack-among-k-12-online-distance-educators-in-the-united-states

Arnesen, K. T., Hveem, J., Short, C. R., West, R. E., & Barbour, M. K. (2019). K-12 online learning journal articles: trends from two decades of scholarship. *Distance Education*, *40*(1), 32-53. https://doi.org/10.1080/01587919.2018.1553566

Arya, P., Christ, T., & Wu, W. (2020). Patterns of technological pedagogical and content knowledge in preservice-teachers' literacy lesson planning. *Journal of Education and Learning, 9*(5), 1-14. https://doi.org/10.5539/jel.v9n5p1

Backfisch, I., Lachner, A., Hische, C., Loose, F., & Scheiter, K. (2020). Professional knowledge or motivation? Investigating the role of teachers' expertise on the quality of technology-enhanced lesson plans. *Learning and Instruction, 66,* 101300. https://doi.org/10.1016/j.learninstruc.2019.101300

Beach, K. D., Washburn, E. K., Gesel, S. A., & Williams, P. (2021). Pivoting an elementary summer reading intervention to a virtual context in response to COVID-19: An examination of program transformation and outcomes. *Journal of Education for Students Placed at Risk, 26*(2), 112-134. https://doi.org/10.1080/10824669.2021.1906250

Bennett, S. V., Gunn, A. A., & Peterson, B. J. (2021). Access to multicultural children's literature during COVID-19. *The Reading Teacher, 74*(6), 785-796. https://doi.org/10.1002/trtr.2003

Beschorner, B., & Woodward, L. (2019). Long-term planning for technology in literacy instruction. *The Reading Teacher*, *73*(3), 325-337. https://doi.org/10.1002/trtr.1828

Bilici, S. C., Guzey, S. S., & Yamak, H. (2016). Assessing pre-service science teachers' technological pedagogical content knowledge (TPACK) through observations and lesson plans. *Research in Science & Technological Education, 34*(2), 237-251. https://doi.org/10.1080/02635143.2016.1144050

Bonafini, F. C., & Lee, Y. (2021). Investigating prospective teachers' TPACK and their use of mathematical action technologies as they create screencast video lessons on iPads. *TechTrends*, *65*(3), 303-319. https://doi.org/10.1007/s11528-020-00578-1

Borup, J., West, R. E., Graham, C. R., & Davies, R. S. (2014). The adolescent community of engagement framework: A lens for research on K-12 online learning. *Journal of Technology and Teacher Education, 22*(1), 107-129. https://www.learntechlib.org/p/112371

Boschman, F., McKenney, S., & Voogt, J. (2015). Exploring teachers' use of TPACK in design talk: The collaborative design of technology-rich early literacy activities. *Computers and Education*, *82*, 250-262. https://doi.org/10.1016/j.compedu.2014.11.010

Brantley-Dias, L., & Ertmer, P. A. (2013). Goldilocks and TPACK: Is the construct "Just Right?". *Journal of Research on Technology in Education*, *46*(2), 103-128. https://doi.org/10.1080/15391523.2013.10782615

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Chamberlain, L., Lacina, J., Bintz, W. P., Jimerson, J. B., Payne, K., & Zingale, R. (2020). Literacy in lockdown: Learning and teaching during COVID-19 school closures. *The Reading Teacher*, *74*(3), 243-253. https://doi.org/10.1002/trtr.1961

Chen, X., & Greenwood, K. (2021). Supporting young students' word study during the COVID-19 quarantine: ABC scavenger hunt. *The Reading Teacher*, *74*(6), 819-823. https://doi.org/10.1002/trtr.2005

Cheng, S., & Xie, K. (2018). The relations among teacher value beliefs, personal characteristics, and TPACK in intervention and non-intervention settings. *Teaching and Teacher Education*, *74*, 98-113. https://doi.org/10.1016/j.tate.2018.04.014

Ciampa, K. (2017). Building bridges between technology and content literacy in special education: Lessons learned from special educators' use of integrated technology and perceived benefits for students. *Literacy Research and Instruction*, *56*(2), 85-113. https://doi.org/10.1080/19388071.2017.1280863

Correia, A. (2020). Healing the digital divide during the COVID-19 pandemic. *Quarterly Review of Distance Education*, *21*(1), 13-22.

Cotton, W. K. (2021). *Examining Technology Integration in K-12 Schools through the TPACK Framework during the COVID-19 Pandemic* (Publication No. 28652738) [Doctoral dissertation, Hampton University]. ProQuest Dissertations Publishing.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE.

Creswell, J. W., & Plano Clark, V. L. (2006). *Designing and conducting mixed methods research* (1st ed.). SAGE.

Cresswell, J. W., Plano Clark, V. L., Gutmann, M. L., & Hanson, W. E. (2003). Advanced mixed methods research designs. In A. Tashakorri & C. Teddle (Eds), *Handbook of mixed methods in social and behavioral research* (pp. 209-240). SAGE.

Crosson, A. C., & Silverman, R. D. (2022). Impact of COVID-19 on early literacy instruction for emergent bilinguals. *Reading Research Quarterly*, *57*(1), 5–14. https://doi.org/10.1002/rrq.456

Darby, F. (2019). How to be a better online teacher advice guide. *The Chronicle of Higher Education*. https://www.chronicle.com/article/how-to-be-a-better-online-teacher/

DeCoito, I., & Estaiteyeh, M. (2022). Transitioning to online teaching during the COVID-19 pandemic: An exploration of STEM teachers' views, successes, and challenges. *Journal of Science Education and Technology*, *31*(3), 340-356. https://doi.org/10.1007/s10956-022-09958-z

Deng, F., Chai, C. S., So, H., Qian, Y., & Chen, L. (2017). Examining the validity of the technological pedagogical content knowledge (TPACK) framework for preservice chemistry teachers. *Australasian Journal of Educational Technology, 33*(3), 1-14. https://doi.org/10.14742/ajet.3508

Doll, K., Ragan, M., Calnin, G., Mason, S., & House, K. (2021). Adapting and enduring: Lessons learned from international school educators during COVID-19. *Journal of Research in International Education*, *20*(2), 114-133. https://doi.org/10.1177/14752409211034399

Domingue, B. W., Hough, H. J., Lang, D., & Yeatman, J. (2021). Changing patterns of growth in oral reading fluency during the COVID-19 pandemic [Policy brief]. *Policy Analysis for California Education*. https://edpolicyinca.org/publications/changing-patterns-growth-oral-reading-fluency-during-covid-19-pandemic

Dorn, E., Hancock, B, Sarakatsannis, J. & Viruleg, E. (2020). COVID-19 and learning loss- disparities grow and students need help. *Mckinsey & Company*. https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-learning-loss-disparities-grow-and-students-need-help.

Eadens, D. W., Maddock, D., Thornburg, A. W., & Abernathy, D. F. (2022). K-12 teacher perspectives on the pandemic pivot to online teaching and learning. *Journal of Pedagogical Research, 6*(1), 131-151. https://doi.org/10.33902/JPR.2022175776

EdWeek Research. (2020). Survey tracker: Monitoring how K-12 educators are responding to coronavirus. *Education Week*. https://www.edweek.org/teaching-learning/survey-tracker-monitoring-how-k-12-educators-are-responding-to-coronavirus/2020/04

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, *47*(4), 47-61. https://doi.org/10.1007/BF02299597

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, beliefs, and culture intersect. *Journal of Research on Technology in Education*, *42*(3), 255-284. https://doi.org/10.1080/15391523.2010.10782551

Fauzi, I., & Sastra Khusuma, I. H. (2020). Teachers' elementary school in online learning of COVID-19 pandemic conditions. *Jurnal Iqra' (Online)*, *5*(1), 58-70. https://doi.org/10.25217/ji.v5i1.914

Fisher, D., & Frey, N. (2020). Lessons from pandemic teaching for content area learning. *The Reading Teacher, 74*(3), 341-345. https://doi.org/10.1002/trtr.1947

Francom, G. M., Lee, S. J., & Pinkney, H. (2021). Technologies, challenges and needs of K-12 teachers in the transition to distance learning during the COVID-19 pandemic. *TechTrends*, *65*(4), 589-601. https://doi.org/10.1007/s11528-021-00625-5

Fritz, R. L., & Vandermause, R. (2018). Data collection via in-depth email interviewing: Lessons from the field. *Qualitative Health Research*, *28*(10), 1640-1649. https://doi.org/10.1177/1049732316689067

Gerber, N. (2020, May 28). Update on districts' teacher policy responses to COVID-19. *National Council on Teacher Quality*. https://www.nctq.org/blog/Update-on-districts-teacher-policy-responses-to-COVID--19

Gibson, L. (2014, August 28). *What is email interviewing?* [Video]. YouTube. https://www.youtube.com/watch?v=wTzJdFbaakg

Hamilton, L. S., Kaufman, J. H., & Diliberti, M. (2020). *Teaching and leading through a pandemic: Key findings from the American educator panels spring 2020 COVID-19 surveys*. RAND Corporation. https://doi.org/10.7249/RRA168-2

Hanny, C. N., Arnesen, K. T., Guo, Q., Hansen, J., & Graham, C. R. (2021). Barriers and enablers to K-12 blended teaching. *Journal of Research on Technology in Education*, 1-22. https://doi.org/10.1080/15391523.2021.1991865

Hawkins, J. E. (2018). The practical utility and suitability of email interviews in qualitative research. *Qualitative Report*, *23*(2), 493-501. https://nsuworks.nova.edu/tqr/vol23/iss2/15/

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020, March 27). The difference between emergency remote teaching and online learning. *Educause Review*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Hofer, M., & Grandgenett, N. (2012). TPACK development in teacher education: A longitudinal study of preservice teachers in a secondary MA Ed. program. *Journal of Research on Technology in Education*, *45*(1), 83-106. https://doi.org/10.1080/15391523.2012.10782598

Hoffman, J. L. (2011). Coconstructing meaning: Interactive literary discussions in kindergarten read-alouds. *The Reading Teacher*, *65*(3), 183-194. https://doi.org/10.1002/TRTR.01025

Holt, L. & Kreamer, H. M. (2020). Literacy instruction needs for classrooms impacted by the COVID-19 pandemic. *Research Issues in Contemporary Education*, *5*(3), 26-41. https://eric.ed.gov/?id=EJ1293467

Hughes, J. E., & Scharber, C. M. (2008). Leveraging the development of English TPCK within the deictic nature of literacy. In M. C. Herring, M. J. Koehler, & P. M. Mishra (Eds.), *Handbook of Technological Pedagogical Content Knowledge (TPCK) for educators* (1st ed.). Routledge. https://doi.org/10.4324/9781315759630

Hutchison, A., & Colwell, J. (2016). Preservice teachers' use of the technology integration planning cycle to integrate iPads into literacy instruction. *Journal of Research on Technology in Education*, *48*(1), 1-15. https://doi.org/10.1080/15391523.2015.1103146

Jang, S. S., & Tsai, M. F. (2012). Exploring the TPACK of Taiwanese elementary mathematics and science teachers with respect to use of interactive whiteboards. *Computers and Education*, *59*(2), 327-338. https://doi.org/10.1016/j.compedu.2012.02.003

Johnson, A. M., Jacovina, M. E., Russell, D. G., & Soto, C. M. (2017). *Challenges and solutions when using technologies in the classroom. In adaptive educational technologies for literacy instruction* (1st ed., pp. 13-30). Routledge. https://doi.org/10.4324/9781315647500-2

Kraft, M. A., Simon, N. S., & Lyon, M. A. (2020). Sustaining a sense of success: The importance of teacher working conditions during the COVID-19 pandemic. (EdWorkingPaper: 20-279). *Annenberg Institute at Brown University*. https://doi.org/10.26300/35nj-v890

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)? *Journal of Education*, *193*(3), 13-19. https://doi.org/10.1177/002205741319300303

Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E., & Liu, J. (2020). Projecting the potential impact of COVID-19 school closures on academic achievement. *Educational Researcher*, *49*(8), 549-565. https://doi.org/10.3102/0013189X20965918

Lennox, S. (2013). Interactive read-alouds—an avenue for enhancing children's language for thinking and understanding: A review of recent research. *Early Childhood Education Journal*, *41*, 381-389. https://doi.org/10.1007/s10643-013-0578-5

Liao, Y. C., Ottenbreit-Leftwich, A., Zhu, M. *et al.* (2021). How can we support online learning for elementary students? Perceptions and experiences of award-winning K-6 teachers. *TechTrends*, *65*(6), 939-951. https://doi.org/10.1007/s11528-021-00663-z

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE Publications.

Locke, V. N., Patarapichayatham, C., & Lewis, S. (2021). Learning loss in reading and math in U.S. schools due to the COVID-19 pandemic. *Istation*. 1-39. https://www.istation.com/Content/downloads/studies/COVID-19_Learning_Loss_USA.pdf

Maeng, J. L., Mulvey, B. K., Smetana, L. K., & Bell, R. L. (2013). Preservice teachers' TPACK: Using technology to support inquiry instruction. *Journal of Science Education and Technology*, *22*(6), 838-857. https://doi.org/10.1007/s10956-013-9434-z

Marshall, D. T., Shannon, D. M., & Love, S. M. (2020). How teachers experienced the COVID-19 transition to remote instruction. *Phi Delta Kappan*, *102*(3), 46-50. https://doi.org/10.1177/0031721720970702

Mason, D. M., & Ide, B. (2014). Adapting qualitative research strategies to technology savvy adolescents. *Nurse Researcher*, *21*(5), 40-45. https://doi.org/10.7748/nr.21.5.40.e1241

Niess, M. L. (2011). Investigating TPACK: Knowledge growth in teaching with technology. *Journal of Educational Computing Research*, *44*(3), 299-317. https://doi.org/10.2190/EC.44.3.c

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), 1-13. https://doi.org/10.1177/1609406917733847

Ocak, C., & Baran, E. (2019). Observing the indicators of technological pedagogical content knowledge in science classrooms: Video-based research. *Journal of Research on Technology in Education*, *51*(1), 43-62. https://doi.org/10.1080/15391523.2018.1550627

Ogodo, J. A, Simon, M., Morris, D., & Akubo, M. (2021). Examining K-12 teachers' digital competency and technology self-efficacy during COVID-19 pandemic. *Journal of Higher Education Theory and Practice, 21*(11), 13-27. https://doi.org/10.33423/jhetp.v21i11.4660

Ozgur, H. (2020). Relationships between teachers' technostress, technological pedagogical content knowledge (TPACK), school support and demographic variables: A structural equation modeling. *Computers in Human Behavior, 112*, 106468. https://doi.org/10.1016/j.chb.2020.106468

Özgün Koca, S. A., Meagher, M., & Edwards, M. T. (2011). A teacher's journey with a new generation handheld: Decisions, struggles, and accomplishments. *School Science and Mathematics*, *111*(5), 209-224. https://doi.org/10.1111/j.1949-8594.2011.00080.x

Poletti, M. (2020). Hey teachers! Do not leave them kids alone! Envisioning schools during and after the coronavirus (COVID-19) pandemic. *Trends in Neuroscience and Education, 20*, 100140. https://doi.org/10.1016/j.tine.2020.100140

Project Tomorrow. (2020). 90 days that changed K-12 teaching and learning: The shift to digital learning. https://tomorrow.org/speakup/2020-90-Days-That-Changed-K-12-Teaching-Learning.html

Raygan, A., & Moradkhani, S. (2020). Factors influencing technology integration in an EFL context: Investigating EFL teachers' attitudes, TPACK level, and educational climate. *Computer Assisted Language Learning*. https://doi.org/10.1080/09588221.2020.1839106

Reimer, D., Smith, E., Andersen, I. G., & Sortkær, B. (2021). What happens when schools shut down? Investigating inequality in students' reading behavior during Covid-19 in Denmark. *Research in Social Stratification and Mobility*, *71*, 1-5. https://doi.org/10.1016/j.rssm.2020.100568

Samuels P. (2015). Statistical methods–scale reliability analysis with small samples. Birmingham: Birmingham City University, Centre for Academic Success. http://www.open-access.bcu.ac.uk/6077/1/__staff_shares_storage%20500mb_Library_ID112668_Stats%20Advisory_New%20Statistics%20Workshops_17ReliabilityAnalysis_ReliabilitySmallSamples3.pdf

Schleicher, A. (2020). Schooling disrupted, schooling rethought: How the COVID-19 pandemic is changing education, *Organization for Economic Co-operation and Development (OECD)*. https://read.oecd-ilibrary.org/view/?ref=133_133390-1rtuknc0hi&title=Schooling-disruptedschooling-rethought-How-the-Covid-19-pandemic-is-changing-education

Schmid, M., Brianza, E., & Petko, D. (2021). Self-reported technological pedagogical content knowledge (TPACK) of pre-service teachers in relation to digital technology use in lesson plans. *Computers in Human Behavior*, *115*, 1-12. https://doi.org/10.1016/j.chb.2020.106586

Shulman, L.S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14.

Steckel, B., Shinas, V. H., & Van Vaerenewyck, L. (2015). Artistic technology integration: Stories from primary and elementary classrooms. *The Reading Teacher*, *69*(1), 41-49. https://doi.org/10.1002/trtr.1356

Steed, E. A., & Leech, N. (2021). Shifting to remote learning during COVID-19: Differences for early childhood and early childhood special education teachers. *Early Childhood Education Journal*, *49*(5), 789-798. https://doi.org/10.1007/s10643-021-01218-w

Stoetzel, L. & Shedrow, S. J. (2021). Making the move online: Interactive read-alouds for the virtual classroom. *The Reading Teacher*, *74*(6), 747-756. https://doi.org/10.1002/trtr.2006

Svrcek, N. S., Rath, L., Olmstead, K., & Colantonio-Yurko, K. (2022). "We are still putting out fires": Considering educator intentionality in remote instruction during the COVID-19 pandemic. *Education and Information Technologies*, *27*(1), 407-428. https://doi.org/10.1007/s10639-021-10679-w

Taimur, S., Sattar, H., & Dowd, E. (2021). Exploring teachers' perception on successes and challenges associated with digital teaching practice during COVID-19 pandemic school closures. *Pedagogical Research, 6*(4), 1-13. https://doi.org/10.29333/pr/11253

Viner, R. M., Russell, S. J., Croker, H., Packer, J., Ward, J., Stansfield, C., Mytton, O., Bonell, C., & Booy, R. (2020). School closure and management practices during coronavirus outbreaks including COVID-19: A rapid systematic review. *Lancet Child Adolescent Health*, *4*(5), 397-404. https://doi.org/10.1016/S2352-4642(20)30095-X

Walker-Dalhouse, D. & Risko, V. J. (2020). Meeting the COVID-19 challenges to literacy instruction: A focus on equity-centered strategies [Literacy leadership brief]. International Literacy Association. https://www.literacyworldwide.org/docs/default-source/where-we-stand/ila-meeting-the-COVID-19-challenges.pdf

Washburn, E. K., Beach, K. D., Gesel, S. A., Billingsley, M., Howard, C., King, B., & Vintinner, J. P. (2021). Zooming into summer: Key takeaways from a virtual summer reading intervention. *Reading Teacher*, *74*(6), 812-818. https://doi.org/10.1002/trtr.2000

Xu, W., & Zammit, K. (2020). Applying thematic analysis to education: A hybrid approach to interpreting data in practitioner research. *International Journal of Qualitative Methods*, *19*, 1-19. https://doi.org/10.1177/1609406920918810

Appendix

Initial Email Interview Questions

1. Describe your literacy instruction since transitioning to virtual/online learning.
2. Describe what has stayed the same and what has changed in your literacy instruction since moving to virtual/online learning.
3. Describe how you incorporate technology into your virtual literacy instruction.
4. Describe how virtual/online learning has impacted student learning and motivation in literacy.
5. Discuss your successes and challenges in implementing virtual/online literacy instruction.
6. Have you pursued any PD related to technology integration since moving to virtual/online teaching? If so, please describe.

Sampling of Follow-Up Interview Questions

1. How much time on average are you spending on prepping for your virtual instruction? Is it more/less than what you would typically spend time on? Approximately how much time do you think you are spending daily/weekly on face-to-face interactions with your students (literacy)?
2. Have you had to spend any of your personal income on the tools that you have used in your virtual instruction?
3. Do you think you will change anything in your literacy instruction in the upcoming school year (assuming schools will be returning to "normal") based on what occurred during virtual instruction/learning?
4. If you feel comfortable, do you mind sharing any of your created instructional lessons/materials with me? I would love to see them!

5. It's good to hear that you are able to continue some small group instruction. A big issue is how teachers continue to provide services for students. Can you "walk me" through what a typical small group literacy instruction (reading group) "looks like?"
6. You made a really good point when you said: *It is challenging because I have to really evaluate which skills are best taught in person and which can be taught easily asynchronously.* Could you expand on this? Perhaps give an example as to when you decided to teach something in-person and when you made a choice for asynchronous with a rationale?
7. You are doing a lot to incorporate the OG approach in your teaching. I know during our last conversation, you spoke a lot about using literature/books with your students. How have you continued with this during virtual learning?
8. It sounds like you are implementing read-alouds well! Are you working on any foundational early literacy skills as well? (i.e., alphabetic principle, phonological awareness, etc.) If so, how are you incorporating this?

TPACK Survey

Directions: Please respond to each statement in the context of your virtual/online literacy instruction using the following scale. 1 (*Poor*), 2 (*Fair*), 3 (*Good*), 4 (*Very Good*), and 5 (*Excellent)*. Please respond to each statement in the context of your virtual/online literacy instruction.

Pedagogical Knowledge

a. My ability to determine a particular strategy best suited to teach a specific literacy concept.
b. My ability to use a variety of teaching strategies to relate various literacy concepts to students.
c. My ability to adjust teaching methodology based on student performance/feedback.

Technological Knowledge

a. My ability to troubleshoot technical problems associated with hardware (e.g., network connections).
b. My ability to address various computer issues related to software (e.g., downloading appropriate plug-ins, installing programs).
c. My ability to assist students with troubleshooting technical problems with their personal computers.

Content Knowledge

a. My ability to create materials that map to specific literacy district/state standards.
b. My ability to decide on the scope of literacy concepts taught within my class.
c. My ability to plan the sequence of literacy concepts taught within my class.

Technological Content Knowledge

a. My ability to use technological representations (i.e., multimedia, visual demonstrations, etc.) to demonstrate specific concepts in literacy.
b. My ability to implement a district literacy curriculum in an online environment.
c. My ability to use various courseware programs to deliver literacy instruction (e.g., Google Classroom, Zoom, etc.).

Pedagogical Content Knowledge

a. My ability to distinguish between correct and incorrect problem-solving attempts by students.
b. My ability to anticipate likely student misconceptions within a particular topic in literacy.
c. My ability to comfortably produce literacy lesson plans with an appreciation for the topic.
d. My ability to assist students in noticing connections between various concepts in the literacy curriculum.

Technological Pedagogical Knowledge

a. My ability to create an online environment that allows students to build new knowledge and skills in literacy.
b. My ability to implement different methods of teaching literacy online.
c. My ability to moderate online interactivity among students during literacy instruction.
d. My ability to encourage online interactivity among students during literacy-related instruction.

Technological Pedagogical Content Knowledge

a. My ability to use online student assessment to modify instruction in literacy.
b. My ability to use technology to predict students' skills/understanding of a particular topic in literacy.
c. My ability to use technology to create effective representations of literacy content.
d. My ability to meet the overall demands of online teaching in literacy.