

**TECHNOLOGY INTEGRATION IN ELEMENTARY LITERACY
CLASSROOMS: TEACHERS' PERCEPTIONS AND THE ROLE OF
PROFESSIONAL DEVELOPMENT**

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TECHNOLOGY INTEGRATION IN ELEMENTARY LITERACY CLASSROOMS:
TEACHERS' PERCEPTIONS AND THE ROLE OF PROFESSIONAL DEVELOPMENT

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Abstract

As educators prepare students with functional reading and writing skills, they must consider implementing technology into instruction to support students' successful integration into a technology-driven society. In doing so effectively, it is important to consider teachers' perceptions about teaching literacy content with the use of technology. This consideration will support students' overall literacy development such as understanding, interpreting, and communicating using an assortment of contexts. The purpose of this qualitative research study, in the form of an online survey and interview, was to understand teachers' perceptions of the value of technology integration into their literacy instruction, perceptions of their own technological pedagogical content knowledge, and to determine the role of professional development in the implementation of technology in elementary literacy classrooms. Data from this research found that technology integration is valued by current elementary educators. These educators feel confident in using technology for whole-class instruction, but further data analysis revealed that teachers feel that meaningful professional development opportunities to support individual literacy practice are absent. These findings indicate the need for personalized professional development and mentorship for elementary educators to support the purposeful integration of technology to support students' individualized literacy skills.

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Chapter One- Introduction

Overview of the Study

When preparing students to be contributing members of society, the education system must consider early literacy skills paired with the understanding that the 21st century has shifted the application of simple reading and writing skills to an environment that requires a thorough application of digital literacy (Altun & Akyildiz, 2017; Pilgrim & Martinez, 2013). Educators are challenged with the task of incorporating technology into their instruction as a teaching tool and as a device that students must use properly. In time, this technology will become crucial for communication and collaboration with peers in a technology-rich workforce (Ertmer et al., 2012; ISTE, 2022a). With the increased demand for technology integration into classroom settings, plus current events related to the COVID-19 pandemic, many school districts have implemented a 1:1 initiative providing each student with a technological device that may be used at home or school (Cho & Littenberg-Tobias, 2016; Cochrane, 2020). With this addition, teachers are expected to seamlessly integrate technology into their instructional practices (Cochrane, 2020). Though, this seamless integration comes with its challenges. To positively enhance student achievement, teachers must blend their knowledge of literacy content with the understanding that technology features can be used to improve student's learning experiences (U.S. Dept. of Education, 2016).

Educators who can synthesize curriculum content and provide instructional techniques that prove successful for student achievement are said to have strong pedagogical content knowledge (Altun, 2019; Banas & York, 2014; Hutchison & Woodward, 2014). When such educators can merge modes of technology into their

teaching they are known to have technological pedagogical content knowledge (Mishra & Koehler, 2006). This skill is oftentimes difficult to master as it requires an educator to know *what* technology is best suited for the content and *how* it should be integrated into a child's learning day (Mishra & Koehler, 2006). Much of the research states that an educator's lack of self-efficacy with technology creates internal barriers that limit the use of a computer-based learning environment (Butler & Sellbom, 2002; Dinc, 2019; Ertmer, 2005; Kopcha, 2012). Inadequate self-efficacy, lack of time to prepare for technology integration and insufficient knowledge about technology are additional challenges faced by educators today (Hilaire & Gallagher, 2020; Kopcha, 2012).

Literacy content is "like a braid of interwoven threads" that consists of academic milestones that make up reading and writing development (Bear et al., 2019, p. 1). As these skills expand and progress, the literacy thread will strengthen and grow. Foundational literacy skills are essential for a child's academic development and research has stressed the importance of educators teaching their students these introductory skills within a traditional style classroom (Lovell & Phillips, 2009; Mangen, 2018; Parette et al., 2008; Santoro & Bishop, 2010). Furthermore, Hutchison and Woodward (2014) and Walsh (2010) emphasized these points as they recommend that foundational literacy skills be taught to students in a non-digital form first, such as small group instruction, teacher modeling, and independent practice. Then, children should be given access to explore the technology device before a teacher assigns individualized tasks to it. This process suggests that students grasp the concept of the lesson, utilize technology appropriately and build their literacy knowledge (Edwards-Groves, 2012; Storz & Hoffman, 2013; Warschauer, 2008). To implement technology as suggested, educators

require strong pedagogy in teaching literacy and must understand how to utilize specific technologies and integrate them effectively into their classrooms (Hutchison & Woodward, 2014; U.S. Department of Education, 2016).

Computer-assisted instruction is a form of technology integration that is commonly used on a personal learning device that is assigned by the teacher to support individual student needs for enrichment or remediation of taught skills (Holum & Gahala, 2001; Northrop & Killeen, 2013; Picton, 2019). The use of personal technology during literacy instruction increases the capability for students to work at their own pace, advance individualized skills and receive immediate feedback with engaging displays that enhance student motivation (Cho et al., 2016; Lovell & Phillips, 2009; Macaruso & Walker, 2008). Integration of personalized learning experiences with technology is successful for student achievement through research and observation conducted by Baker and Lastrapes (2019), Blok et al. (2002), Macaruso and Walker (2008), and Santoro and Bishop (2010). In addition to providing students with support in personalized enrichment and remediation, technology integrated into literacy instruction is a successful tool for information and communication.

By providing students with opportunities to use information and communication technologies during classroom instruction and learning tasks, teachers are engaging students in experiences within their formal curriculum. Educators are also exposing children to the broad use of communication tools and enhancing their digital literacy skills (Burnett et al., 2006; Sanchez-Cruzado et al., 2021). Information and communication technologies have been found to have a positive impact on student communications with peers and educators, provide support for student research, and offer

a variety of resources for writing development (Edwards-Groves, 2012; ISTE, 2022a; Macaruso & Walker, 2008; McDermott & Gormley, 2015).

Despite the benefits of using technology in the classroom, research conducted by Staples et al. (2005) identified challenges faced by administration when implementing these changes into educators' instructional practices — especially when teachers either did not feel a desire or believed there was a need to alter their pedagogical method. To alter a teacher's perspective when using technology, research suggests that teachers should be provided with opportunities to see and understand technology as it relates to the curriculum (Crompton & Sykora, 2021; Ertmer, 2005; Hermans et al., 2008). Teachers must accept that technology is an avenue to enhance curriculum content, not replace great teaching (Staples et al., 2005; Yildiz & Aktas, 2014). Research is required to determine current teachers' perceptions of their self-efficacy as it relates to technology integration into their literacy classroom and the value of technology as it is used to support student achievement. This information will support educational leaders as they plan and implement purposeful professional development.

Educators have voiced concern regarding inadequate professional development opportunities as it relates to their core content area of literacy instruction and technology integration (Hutchison, 2012; Keengwe & Onchwari, 2009; Scott & Mouza, 2007). This concern implies that further research needs to be conducted about teachers' perceptions of professional development's role in technology integration for literacy instruction. Professional development experiences that are considered most influential are those that focus on teachers' concerns, their range of technological ability, and their content areas (Guskey, 2002). Presenting opportunities for educators to develop their technical

knowledge at their ability level allows them to maximize their time, diminish inadequate self-efficacy and more efficiently support their pedagogies (Brinkerhoff, 2006; Hilaire & Gallagher, 2020). More specifically, Hutchison (2012) commends professional development that relates directly to the teacher's core content area(s). This provides educators with strategies suitable for student achievement. Educational scholars recommend time for teachers to observe peer mentors who model effective implementation strategies. This method of teacher development offers live demonstrations to support specific content areas (Ertmer, 2005; Clark & Boyer, 2016). Additionally, professional development should provide teachers with time to prepare and time to reflect with peers and administrative staff (Kim et al., 2013; McKenney, 2015). These strategies for professional development ensure that teachers are utilizing technology as a means to provide students with high-level tasks for individualized enrichment, remediation, and communication capabilities to support overall student achievement.

Need for the Study

For literacy instruction, research recommends that students develop foundational reading and writing skills simultaneously, with the support of direct instruction and modeling provided by the educator (Bear et al., 2019; Edwards-Grove, 2012; Graham & Santangelo, 2014). As these skills develop, teachers are encouraged to present students with technology features to enrich learning tasks or remediate the skills taught (Mangen, 2018; Parette et al., 2008; Santoro & Bishop, 2010). Research has found that enhancing learning environments with supplemental technology provides students with motivation, direct communications for feedback, and the opportunity to experience a student-centered

classroom structure (Altun, 2019; Lovell & Phillips, 2009; Warschauer, 2008).

Unfortunately, however, there is limited information about current teachers' perceptions related to technology integration within literacy instruction. Additionally, with the increased availability of technological devices for teachers and students, 1:1 technology initiatives have created a shift in education (Cochrane, 2020). More research has been conducted to gather insight from existing elementary school teachers who are expected to implement 1:1 technology initiatives during literacy instruction. The results support educators by providing information about applicable classroom practices.

As the most impactful person in a student's education, an effective teacher is expected to know and understand the content of the course and how to skillfully integrate technology features into the lesson (ISTE, 2022a; Mishra & Koehler, 2006). This deep understanding and expert synthesis are named technological pedagogical content knowledge, which, for many teachers, is underdeveloped (Mishra & Koehler, 2006; Scherer et al., 2017). Two major barriers to technology integration are a teacher's lack of self-efficacy in using technology and an educator's belief that integrating technology into the curriculum may not even enhance students' learning experience (Butler & Sellbom, 2002; Christmann & Badgett, 2003; Ertmer et al., 2012; Sanchez-Cruzado et al., 2021). A study conducted by Hermans et al. (2008) proposed a theory based on teachers' beliefs and their willingness to add technology into their classroom: teachers who displayed a traditional approach to education did not adopt technology into their current pedagogy. Their traditional educational belief and pedagogy created a barrier that inhibited the use of technology, resulting in minimizing students' exposure to technology-enhanced literacy instruction.

Educators and school district personnel are obligated to provide students with abundant use of technology within the classroom that proves to be useful and productive as these students become active members of the community (Keengwe & Onchwari, 2009). It was stressed by Paratore et al. (2016) and Sanchez-Cruzado et al. (2021) that the purpose of technology, when integrated effectively into the curriculum, is to support a learner-centered classroom environment, provide enhancements to the curriculum content, and meet the demands of the rapidly changing 21st century. Unfortunately, however, both groups of scholars emphasize that this may not be happening. For purposeful technology integration, an educator must have a thorough knowledge of content standards, must be aware of various technology tools, and be able to identify how to unite technology seamlessly into student learning (Mishra & Koehler, 2006). The ability to do so requires ongoing professional development and adequate support from school district administration. Currently, there is a disconnect between this growing demand for computer-based learning environments and adequate professional development opportunities for literacy teachers (Bitner & Bitner, 2002; Clark & Boyer, 2016; Kim et al., 2013; Sanchez-Cruzado et al., 2021; Spiteri & Rundgren, 2018).

Teachers' perceptions provide rich first-hand experiences and a broad range of views related to technology integration in the literacy curriculum. Creswell (2022) has stressed the importance of collecting the opinion of as many individuals as possible to present varying perspectives during data analysis. Also, Creswell (2022) proclaimed that research conducted at the participant's place of work provides the researcher with more reliable data. These authentic experiences of current teachers' perceptions have enhanced the validity of this research. There was a need for this study to identify teachers'

perceptions about the effectiveness of technology integration into daily literacy practice to determine the perceptions of teachers about their ability to integrate technology into their literacy curriculum. Finally, the research conducted provided insight into the role of professional development, and how it is used to support teaching with technology for the enhancement of student achievement.

Statement of the Problem

While research has focused on student achievements displayed after the technology is integrated into the classroom, there is limited research that explores teachers' perceptions of the value of technology integration within their literacy instruction and its impact on overall student achievement. This research study has explored literacy planning and instruction through the eyes of current educators.

Throughout the literature, there is evidence of a strong relationship between an educator's personal belief in their self-efficacy and technology integration (Hermans, et al., 2008; Howard et al., 2015; Schmidt et al., 2009). Teachers have internal barriers related to the use and integration of technology, minimizing the adoption of a computer-based learning environment (Butler & Shellbom, 2002; Spiteri & Rundgren, 2018). Ultimately, low-level use of technology is not adequate to meet the needs of 21st-century learners (Altun & Akyildiz, 2017). This is problematic for students who are growing up in a society led by technological devices used for communication, collaboration, and contribution to the community. This qualitative study has gathered teachers' perceptions about their technological pedagogical content knowledge and expanded on this concept as 1:1 technology initiatives increase.

To minimize internal barriers that restrict teachers from utilizing technology in their teaching, the administration must understand and create professional development sessions that are relevant to the course content and teachers' needs in the classroom. This study collected teachers' perceptions about the role professional development has in this implementation process. The findings from this study support teachers in planning instruction and determining the value of technology as it is integrated into the classroom. This research has provided insight for educational leaders as it displays the purpose of professional development and how it can support a range of teachers' experiences with technology.

Definition of Terms

The following terms are defined for this study:

1:1 (one-to-one) technology initiative- “refers to the technological movement of every child in the classroom, school, or school district, etc., having a laptop, or device, in the classroom to manipulate and learn with as a tool” (Harris et al., 2016, p. 378).

Barrier- any factor preventing or restricting teachers' use of technology in the classroom (Brinkerhoff, 2006).

Computer-Assisted Instruction- refers to instruction or remediation presented on a computer. These programs may be interactive with sounds, animation, and demonstrations. This instructional tool allows children to work at their own pace or individually (Yildiz & Aktas, 2014).

Computer-Based Learning Environment- provides students with a non-linear format to their education through the use of computers with multiple forms of content representations such as text, audio, and video (Moos & Azevedo, 2009).

Content Knowledge- the knowledge of an educator's subject matter to be taught (Banas & York, 2014).

Digital Citizenship- “students recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they act and model in ways that are safe, legal, and ethical” (ISTE, 2022b, p.2).

Digital Literacy- “the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills” (American Library Association, 2022, p.1).

Information and Communication Technology- “includes a wide variety of technologies, including computers and software learning tools, networking systems and protocols, hand-held digital devices, digital cameras and camcorders, and other technologies, including those not yet developed, for accessing, managing, creating, and communicating information” (National Assessment Governing Board, 2020, p.1).

Literacy- “the ability to identify, understand, interpret, create, compute, and communicate using visual, audible, and digital materials across disciplines and in any context” (International Literacy Association, 2021, Literacy Glossary section).

Pedagogy- “the art and science of teaching” (Friedrich & Trainin, 2016, p. 1457).

Pedagogical Knowledge- an educator’s knowledge about “the processes and practices of teaching and learning” (Banas & York, 2014, p. 729).

Pedagogical Content Knowledge- knowing what instructional approaches are most suitable for the content (Hutchison & Woodward, 2014).

Professional Development- important strategies used to support the development of an educator’s skills, knowledge, and other characteristics that advocate for the complex skills needed to teach students to be prepared for further education and work in the 21st century (Darling-Hammond et al., 2017).

Technology Integration- “the incorporation of technology resources and technology-based practices into the daily routines, work and management of schools” (Ogle et. al., 2002, p. 75).

Technological Knowledge- “an educator’s knowledge of available technological tools and their ability to achieve selected tasks” (U.S. Department of Education, 2016).

Technological Content Knowledge- “an understanding of how technology and content are reciprocally related and involves knowledge of how one’s subject matter can be changed by the application of technology” (Hutchison & Woodward, 2014, p. 458).

Technological Pedagogical Content Knowledge- when teachers “interpret curricular standards and goals and make that content accessible to learners through their instruction and the integration of digital technology” (Hutchison & Woodward, 2014, p. 457).

Limitations of the Study

This qualitative study gathered information from participants and there were some limitations, due to the method and setting. Data was limited to the perceptions of elementary classroom teachers within school districts located in southeastern Pennsylvania. As a result, a limitation of this study was the geographic location of the educator participants. The results cannot be generalized for school district administrators and educators from another geographic location. Additionally, this study focused on elementary classroom teachers, which limited the number of participants.

Research Questions

The following questions will be addressed in this study:

1. What are teachers' perceptions when considering the value of technology integration in literacy instruction?
2. What are teachers' perceptions of their own technological pedagogical content knowledge (TPACK) during literacy instruction?
3. What are teachers' perceptions of the role of professional development in the implementation of technology in elementary literacy classrooms?

Summary

Elementary students require teachers who have deep knowledge of the literacy continuum. To meet the demands of today's society and enhance the literacy curriculum, teachers are encouraged to supplement literacy learning tasks with technology (ISTE, 2022a; U.S. Department of Education, 2016). A computer-based learning environment supports this and provides students with technology exposure during instructional and

individualized learning times through the use of computer-assisted instruction and information and communication technologies. Today, most of this individualized skill practice is done on a personal learning device applied as a result of 1:1 district initiatives (Cho & Littenberg-Tobias, 2016; Cochrane, 2020).

Implementing computer-assisted instruction has been found to support students' literacy development, as it has the potential to provide personalized enrichment and skill remediation when assigned by teachers (Yildiz & Aktas, 2014). Additionally, information and communication technologies offer students an outlet to explore the internet for reading and writing development. The use of information and communication technologies expands the availability of communication with teachers and peers and provides opportunities for students to enhance their writing composition and explore a range of text for reading enhancement (Peterson-Karlan, 2011). While research has focused on the immediate outcome of these technology tools, little research has focused on current teachers' perceptions about the relevance and effectiveness of technology integration as it is applied to their literacy classroom. This type of data will enable educational leaders to gain a perspective on the success and challenges of technology as it is implemented into a child's daily routine.

For some teachers, technology knowledge supports their application of computer-assisted instruction and information and communication technologies. However, for others, the implementation process does not fit into current teaching pedagogy. Teachers must feel confident in their knowledge of the literacy development continuum and how to best apply technology as a tool to support student achievement. Further research will encourage educators to reflect on their strengths and weaknesses when related to their

technological pedagogical content knowledge, as it relates to literacy instruction. The process of self-reflection acts as a critical component to support a positive change in teachers' pedagogy (Darling-Hammond et al., 2017).

As the demand for technology integration rises, so does the expectation for quality professional development opportunities. Unfortunately, educators are not experiencing development opportunities that meet their needs, address their concerns, or support their content area (Clark & Boyer, 2016; Hutchison & Reinking, 2011; Kim et al., 2013; Spiteri & Rundgren, 2018). Professional development must support these areas of concern to positively impact student achievement. This research study determined the role of professional development for technology integration to provide educators with strategies that support their overall competency and break down internal barriers.

Chapter Two- Literature Review

As teachers prepare students to become successful members of society, the education system is considering the rapidly progressing demands for technology use in communication and overall productivity in the workforce. Altun and Akyildiz (2017) and Pilgrim and Martinez (2013) stress the importance of incorporating information and communication technologies and computer-assisted instruction into literacy instruction at an early age to enhance the academic curriculum and match the demands of the digital environment we live in. As technology is considered for students in elementary grades, school district personnel are tasked with the responsibility to consider technology that proves to be useful and productive for students' academic achievement (Lawrence et al., 2020). It is recommended by the U.S. Department of Education (2016), in Every Student Succeeds Act, that educators consider technology integration for meaningful learning of all students. With this initiative, there is an increase in demand for the use of technologies during classroom instruction, for remediation of skills taught, and for 1:1 digital initiatives where every child receives a personal device, such as an iPad or Chromebook. Currently, the implementation of a 1:1 device has occurred more rapidly than in the past due to the worldwide COVID-19 pandemic (Almonacid-Fierro et al., 2021; Cochrane, 2020). This wide variety of technology integrated into academics is referred to as a computer-based learning environment, and these technology tools are recommended to be used in classrooms to prepare students "to acquire new skills and competencies to survive in this fast-changing environment and prepare them to be ready for technology-oriented working environments" (Altun & Akyildiz, 2017, p. 468).

A classroom rich with technology provides students with a non-traditional approach to learning curricular content (Lawrence et al., 2020; Moos & Azevedo, 2009). This non-traditional pedagogy provides students with content-based tasks at each child's ability level and is typically done on a personal learning device. This method is called computer-assisted instruction and gives educators a modern approach to assigning academic tasks for learning extensions or for reteaching a lesson (Yildiz & Aktas, 2014). Furthermore, students who experience technology as a tool used for communication and collaboration, otherwise known as information and communication technologies, experience technology that provides direct contact to teachers and peers through avenues like email, Teams chat, and Zoom video conferencing. Technology can assist teachers with individualized instruction, act as a means of communication, and enhance instruction while engaging students in the learning process (Burnett, 2010; Musti-Rao et al., 2015; Pilgrim & Martinez, 2013). This involvement with computer-assisted instruction and information and communication technologies supports students' transition to becoming contributing members of their community (Altun & Akyildiz, 2017; Ertmer et al., 2012; Hutchinson & Reinking, 2011; Spiteri & Rundgren, 2020; Summak et al., 2010). Utilizing various forms of technology in a classroom provides students with the opportunity to "step out of the confines of the formal school curriculum" and "explore broader notions of literacy" (Burnett et al., 2006, p. 27).

Computer-assisted instruction and information and communication technologies have been highly accessible as a result of 1:1 technology initiatives (Almonacid-Fierro et al., 2021). Nevertheless, technological challenges and internal barriers have caused some teachers to decline the use of computer-based learning environments and other educators

to be derailed in their implementation process (Ertmer et al., 2012; Tondeur et al., 2017). Much of the existing research has identified limitations, or internal barriers, for the use of technology as it relates to an educator's relationship to their content knowledge and their technological content knowledge (Brinkerhoff, 2006; Butler & Sellbom, 2002; Ertmer et al., 2012; Tondeur et al., 2017). These two areas of an educator's experience synthesize together to develop the teacher's technological pedagogical content knowledge, which is the teacher's ability and willingness to use computer-assisted instruction and information and communication technologies in their classroom, without personal limitations (Messina & Tabone, 2013; Scherer et al., 2017). For students to experience a diverse range of technological exposure, educators require strong technological pedagogical content knowledge. To engage these sophisticated pedagogies, administrative staff must include a variety of technology features in well-planned professional development sessions (Bitner & Bitner, 2002; Chang, 2016; Darling-Hammond et al., 2017; Howard et al., 2015).

Ogle et al. (2002) propose that "technology should become an integral part of how the classroom functions, as accessible as all other classroom tools" (p. 79). Similarly, Lawrence et al. (2020) explain that regular exposure to classroom technology is critical for students to "foster autonomy and enhance transferable 21st-century communication skills" (p. 102). This recommendation encourages educators to develop a computer-based learning environment where children expect technology to be used, know how to use it to enhance their education, and identify the device as a tool to support student achievement. For successful integration, this device should not be identified as a novelty item used for games and classroom management (Ogle et al., 2002). Teachers should provide students

with model behavior for use with the device, opportunities to spend time with the technology regularly, experience supplemental practice for various skills, and work with knowledgeable peers to support achievement (Lovell & Phillips, 2009; Parette et al., 2009; Ruggiero & Mong, 2015).

Appropriate and effective technology integration in literacy instruction depends greatly on a teacher's content knowledge of reading and writing and the ability to apply technology to support this learning. It is important to note that explicit and meaningful instruction begins with the teacher, requires well-developed teaching strategies, and builds on skills previously taught. Technology is then used as a tool to support learning (Musti-Rao et al., 2015; Picton, 2019). Teachers who have experience assigning computer-assisted instruction and information and communication technologies as transformative learning tools see more significant student achievement than teachers who use technology as simply a teacher enhancement (Kervin & Mantei, 2010; Lovell & Phillips, 2009; Paratore et al., 2016). These technological enhancements shift a teacher-directed classroom into a student-centered one but must be developed and supported through professional growth opportunities.

Technology in Literacy Instruction

Foundational Skills for Literacy

Reading and writing skills are essential components of literacy (Burnett et al., 2006; Edwards-Groves, 2012; International Literacy Association, 2020; Mangen, 2018). When teaching English language arts to young students, teachers must offer experiences along a literacy continuum. Walsh (2010) validates this point in her research as she

describes the literacy continuum as groups of overlapping content areas for reading and writing. Additionally, the International Literacy Association (2020) recommends that writing instruction be used to support students reading abilities as these subject areas “draw on common sources of knowledge” (p. 4). Furthermore, readers use their knowledge of “words, syntax, usage, and the features of text to decode words and comprehend sentences” while “writers use the same knowledge to spell words, craft sentences, and create compositions” (International Literacy Association, 2020, p. 4). Additional research suggests that foundational literacy instruction must elicit activities that focus on phonics and phonemic awareness, vocabulary, and alphabetic principle (Edwards- Groves, 2012; Graham & Santangelo, 2014; Musti-Rao et al., 2015; Parette et al., 2009; Santoro & Bishop, 2010; Wilkes et al., 2020). Fundamental skills, such as handwriting and fine motor skills, must not be overlooked in the early years as they are paramount for a young child’s literacy development as well (Mangen, 2018). It is recommended that educators of English language arts develop meaningful interactions for children to understand how sounds look in writing, which is called phonics, and establish the ability to hear a series of sounds within the spoken word. This skill development is called phonemic awareness. Phonics and phonemic awareness merge to develop an understanding of the meaning of the text, or alphabetic principle (National Center on Improving Literacy, 2022). As students develop and master the alphabetic principle, they progress through an ability to decode words, read words with automaticity, and fluently read words in context. Students who have a deep understanding of the alphabetic principle also begin to produce the ability to spell words and begin to put ideas on paper in the early stages of writing (Bear et al., 2019).

This interaction between reading and writing development is part of the literacy continuum where educators can overlap skills to support multiple areas of the content. Providing students with a strong foundation for alphabetic principles in reading will support their ability to spell and build their writing composition (Bear et al., 2019). Writing is a critical component of communication in our society and must be developed thoroughly in our young learners (Longcamp et al., 2008; Mangen, 2018). Graham and Harris (2016) collected data about effective writing strategies for young learners and found that “directly teaching spelling enhances spelling competence, resulting in greater gains” in writing composition (p. 361). To build up through this writing continuum to areas like spelling, word work, and writing composition, students must be taught foundational writing skills such as handwriting and fine motor skills first (Longcamp et al., 2008; Mangen, 2018). “Handwriting requires the integration of visual, proprioceptive, and tactile information — hence, motor commands and kinesthetic feedback are closely linked to visual information when we write by hand” (Mangen, 2018, p. 5). Further research related to handwriting and brain development, by Mangen and Balsvik (2016) and Longcamp et al. (2008), found that students who learned handwriting with pencil and paper activated multiple sections of their brain, and when compared to students who learned the letters on a keyboard had no such activation. This research is critical for educators to recognize and understand to best support developing writers.

In addition to handwriting practice, the process of writing and skill instruction are considered foundational skills for elementary writers. As more research is conducted about diverse computer-based learning environments, Edwards-Groves (2012) stresses that “fundamental writing skills should not replace but extend to account for the shift in

learning practices that technology demands” (p. 100). This notion reflects the best teaching practices when integrating technology. Similarly, Graham and Harris (2016) suggest the following writing skills be taught traditionally first, then supplemented with technology practice: sentence construction, drafting, revising, and the attributes of different types of text. This research proposes that foundational writing skills should be learned using conventional materials and teacher modeling, then further writing practice and exposure may develop using information and communication technologies and computer-assisted instruction. As technology shifts our modes of communication within our community and workforce, it is critical to consider the necessary shifts educators must take when teaching writing in elementary classrooms (Aghajani & Adloo, 2018; Ertmer et al., 2012; Pilgrim & Martinez, 2013).

Parette et al. (2009) explain the emergence of the literacy continuum is a time for educators to facilitate and structure interactions with pictures and text as a means to develop reading and writing concurrently. When teaching introductory reading and writing skills, research has stressed direct exposure to the context first, then additional practice using technology devices should follow (Mangen, 2018; Parette et al., 2008; Santoro & Bishop, 2010; Walsh, 2010). Furthermore, Wilkes et al. (2018) proclaim that students who are learning how to read and write will not retain the skills needed for authentic learning unless they are being taught in a linear form. Linear form for authentic learning refers directly to teaching foundational literacy skills to a child first, then introducing technology as a means for enrichment or remediation. Only then will the children begin to grasp the initial reading and writing skills. This notion is further supported by evidence from Burnett et al. (2006), Edwards-Groves (2012), Storz and

Hoffman (2013), and Warschauer (2008) as they found that teaching fundamental literacy skills first, then utilizing individualized technology supports to enhance student achievement in literacy classrooms was most successful for student achievement. Effective linear teaching practices that have been proven to be successful for these foundational skills are small group instruction, teacher modeling, scaffolding, individualized reading practice, and individualized writing instruction (Burnett et al., 2006; Mangen, 2018; Santoro & Bishop, 2010).

These methods of instruction enable elementary educators to shift their classroom structure from a teacher-centered environment to a student-centered environment (Kaput, 2018; Santoro & Bishop, 2010). A student-centered learning environment is also referred to as a differentiated learning environment where educators adapt instructional methods, pace student learning, and apply technological devices to meet the various academic, social, and/or emotional needs of their students. Developmentally appropriate teaching practices guide a teacher's selection of instructional techniques, academic models, learning activities, and technology. Educators must "design authentic, learner-driven activities and environments that recognize and accommodate learner variability" (ISTE, 2022a, p.3). This process of differentiated learning in a computer-based classroom, or a non-linear student-centered environment, is applied when educators choose appropriate forms of technology to meet their students' individualized needs.

Computer-Assisted Instruction to Support Literacy

Noting this positive relationship between supplementing learning tasks with technology and literacy instruction, many research-based methods support computer-assisted instruction and its implementation process. Computer-assisted instruction is a

supplemental learning tool, typically using a 1:1 technology device application, that is assigned by the teacher to target specific learning objectives for a student. Computer-assisted instruction presents content based on a student's individualized academic and pacing needs (Yildiz & Aktas, 2014). Research conducted by Holum and Gahala (2001), Northrop and Killeen (2013), and Picton (2019) found that student achievement was reinforced by technology only when it was aligned with what was taught prior to implementation. For young learners, computer-assisted instruction is more impactful if it follows direct instruction, teacher modeling, guided practice, and independent practice (Blok et al., 2002; Musti-Rao, 2015). More specifically, Northrop and Killeen (2013) recommend a framework for technology integration to ensure that students are working at their instructional level independently, with a gradual release of responsibility from the teacher. Within this framework students receive direct instruction from the teacher, followed by independent practice and skill reinforcements from a chosen technology device or application. This slight shift to student-centered tasks provides teachers with opportunities to assess understanding, adjust lessons, scaffold learning, and provide necessary feedback to the students (Macaruso & Walker, 2008; Musti-Rao, 2015; Northrop & Killeen, 2013; Picton, 2019; Yildiz & Aktas, 2014).

The International Society for Technology in Education (2022), along with Lawrence et al. (2020) and Wilkes et al. (2020) encourage educators to include technology features in their literacy instruction to support student learning with technology. Integrating digital technology, such as computer-assisted instruction, into reading instruction acts as individualized student enrichment during a lesson (Lawrence et al., 2020; Lovell & Phillips, 2009; Wilkes et al., 2020). The capabilities of modern

technological devices offer text-to-speech resources and graphical representations, which support phonological awareness skills, letter names, vocabulary, and comprehension (Santoro & Bishop, 2010; Lovell & Phillips, 2009). Teachers are encouraged to utilize high-quality computerized instruction as a supplemental tool to provide students with targeted skill practice, clear feedback, and the ability to adjust to meet the student's educational needs. These supplemental tools have also been found to provide screen displays that are engaging, age-appropriate, and increase student motivation (Chang, 2016; Lovell & Phillips, 2009; Santoro & Bishop, 2010). In a study conducted by Macaruso and Walker (2008), kindergarten students receiving computer-assisted instruction made significant gains in literacy concepts such as phonological awareness and listening comprehension, when compared to students who did not receive the supplemental learning tool. Similar research led by Blok et al. (2002), Mitchell and Fox (2001), Marcaruso et al. (2006); and Wilkes et al. (2020), found students made noteworthy improvements in phonological and reading skills after computer-assisted instruction was incorporated into their routine. It is important to keep in mind, "there is a developmental progression in children's use of tools and materials, typically moving from exploration to mastery and then to functional subordination "using the tools to accomplish other tasks" (National Association for the Education of Young Children, 2012, p.6). With this suggestion, exploration and experimentation with the technology device are highly encouraged for young learners before academic assessments occur (Inan et al., 2010; National Association for the Education of Young Children, 2012). The use of computer-assisted instruction in writing has also demonstrated positive, individualized student outcomes.

When incorporating computer-assisted instruction into the writing curriculum, Burnett (2010) found that technology acts as a stimulus for a child's composition, and provides opportunities for teachers to scaffold a student's writing development. Additionally, Aghajani and Adloo (2018) and Baker and Lastrapes (2019) found technology integration into the writing curriculum improved the quality of student writing, extended the time devoted to writing per day, and provided support to students with specialized needs. Writing is both creative and technical and has moved beyond a traditional perspective to "encompass multidimensionality which harnesses design and multimodality" (Edwards-Groves, 2012, p. 100). For many students utilizing word processing on a personal device for writing provides scaffolded supports such as spell check, voice command, and editing software (Baker & Lastrapes, 2019; Peterson-Karlan, 2011; Storz & Hoffman, 2013). Especially for students with academic difficulties, these technology features support writing growth because they are "open-ended and allowed for exploratory learning" (Lovell & Phillips, 2009, p. 200). This feature of computer-assisted instruction provides the student with more time to devote to simply writing; a fundamental factor of writing success found by Graham and Harris (2016). Their research discovered students' overall quality of writing increased when they were provided additional time when compared to their peers who did not receive additional time for writing practice within a computer-assisted environment. As education moves to a student-centered learning environment, with non-linear structures, educators must differentiate for student needs and meet the demands of enhanced technologies. A recent, and very successful method for implementing computer-assisted instruction has been to provide each student with a personal technology device, known as a 1:1 initiative.

One-to-One Technology Integration

As students' exposures to computer-assisted instruction in the classroom increase, the demand for personalized learning experiences grow, and school districts have begun to adopt 1:1 initiatives for personal technology devices (Cho et al., 2018; Harris et al., 2016; Rosen & Beck-Hill, 2012). A 1:1 device initiative provides each student "access to an Internet-connected laptop computer at school and in most cases, at home" (Warschauer, 2008, p. 53). The need for more personalized learning to support student-centered instruction created a demand for 1:1 technology integration, where it is perceived that teachers can adjust curriculum content more easily to students' academic levels (Chang, 2016; Hull & Duch, 2019). Additionally, with the impact of a worldwide pandemic and remote learning experiences, state agencies have provided school districts and families with the opportunity to provide low-cost internet services and distribution services for personal learning devices to all students, grades kindergarten to twelfth grade (Reich et al., 2020).

Harris et al. (2016) proclaim that 1:1 technology "allows teachers to better and more quickly differentiate, to administer enrichment, and to also dive deeper into topics of study" (p. 369). Additionally, findings from Lee and Tsai (2010) and Lowther et al. (2012) indicate that students felt more confident entering future work opportunities after exposure to their 1:1 learning environment. Data confirms that personal devices not only support individualized enrichment and remediation for literacy skills, but personal devices provide immediate access to information and communication with peers, teachers, and other students around the world; enhancing individualized literacy achievement.

Information and Communication Technology

Information and communication technologies include a wide variety of technologies, “including computers and software learning tools, networking systems, hand-held digital devices, and other technologies for accessing, managing, and communicating information” (National Assessment Governing Board, 2020, p.1). Information and communication technologies can be described as “the use of digital technologies to generate, distribute, collect, and administer information and communicate in real-time” (Reddy et al., 2020, p. 65). These tools enhance communication with software accessible by students, teachers, and parents. Utilizing platforms such as Teams or Zoom provides students access to communicate through email, live chat, or video conference with their peers within the classroom setting, or outside. Also, students who utilize a personal device can access their teacher to receive direct feedback and raise questions about assignments, or other issues while at home or in school (Cochrane, 2020; Storz & Hoffman, 2013). As the use of technology in schools grows, educators have the opportunity to connect with guardians to enhance family engagement and build relationships with parents (National Association for the Education of Young Children, 2012). Guardians who have access to a personal device may receive and send notifications to the teacher to support their child’s academic experiences. Information and communication technologies not only provide students, teachers, and parents with multiple forms of communication, but it also provides students with the ability to explore the World Wide Web as a supplemental learning tool for reading and writing development.

When information and communication technologies (e.g. the Internet, search engines, video conferencing) are utilized as a supplemental learning tool in reading instruction, it has been found to provide teachers with the opportunity to scaffold text provided to students, resulting in improved reading comprehension and opportunities for student engagement (Picton, 2019; Warschauer, 2008). This scaffolded text may come in many forms and provides students with multiple literacy outlets such as online dictionaries, graphic organizers, and more recently called page-to-screen access (Picton, 2019). Page-to-screen access enhances the number of resources students can access. It provides the opportunity for students to find curricular content and other informational outlets online, resulting in media information that is more “visual, purposeful and authentic” to the student as a reader (Warschauer, 2008, p. 52). Additionally, students may use this text at a self-guided pace, supporting all learning needs (Reddy et al., 2020). The International Society for Technology in Education (2022) also encourages students to empower their learning and leverage technology in order to take an active role in accomplishing learning goals. This emphasizes that the internet is an easily accessible form of information and communication technology that provides students with an ample number of topics related to reading. These capabilities expand the curricular content and create the potential for supporting students’ overall literacy development.

Information and communication technologies also provide students with access to the World Wide Web for support in writing development. Peterson-Karlan (2011) explains that writing with the internet “enables sharing, editing, and collaboration among writers, teachers, and peers” (p. 41). The scholar goes on to say that information and communication technologies act as a support for writing development because it expands

a student's access to information. Furthermore, writing with the support of information and communication technologies promotes different forms of creative writing, expression, and communication (Graham & Harris, 2016; International Literacy Association, 2020; Peterson-Karlan, 2011). Writing with information and communication technologies becomes more interactive than traditional forms of writing instruction as students are encouraged to receive and respond to peer feedback across digital forms (Edwards-Groves, 2012). This interaction creates an authentic audience, prompting a higher quality of writing in the students (Edwards-Groves, 2012, Warshauer, 2008).

Writing on a personal device in this form is labeled as remote learning by Peterson-Karlan (2011). Remote learning provides students with an opportunity to measure their level of writing with the writing of their peers elsewhere; activating engagement, creativity, and motivation (Reddy et al., 2020; Schmidt, 2019). It is important to add, Edwards-Groves (2011) and Walsh (2010) provided insight into the inclusion of technology to enhance the writing curriculum and they implied that technology paired with writing is beneficial, but this is not the only way to support students' writing achievements. The researchers stress the importance of student interpersonal interactions with peers during the writing process while utilizing technology applications. This bond between the students as writers and their use of technology to enhance their writing has produced more meaningful works influenced by peer relationships (Edwards-Groves, 2011; Walsh, 2010).

The use of information and communication technologies in literacy classrooms supports students' personalized learning in forms of academic communication, research, and self-motivation (Xie et al., 2019). As educators integrate more technology features

into their instruction, naturally positive and negative outcomes related to this integration occur. Students need to be thoroughly taught why they are utilizing technology to support their learning and how they are expected to use the technology device. This understanding of the purpose and use of technology is called digital citizenship.

Digital Citizenship and Digital Literacy

Research by McDermott and Gormley (2015) was conducted to observe computer-based learning environments that support literacy instruction. The scholars observed educators providing students with individualized learning activities to support their academic needs with the use of computer-assisted instruction. McDermott and Gormley (2015) mentioned that throughout the observations, students became distracted by the technology tool. The scholars stressed the importance of student self-discipline and strong moral judgment while using technology, first and foremost. This adverse effect of technology use identifies the significance of teaching and maintaining digital citizenship in our young learners initially, then providing students with supplemental technology (Picton, 2019; Santoro & Bishop, 2010). When considering technology integration for literacy instruction, it is important to consider digital citizenship as a skill that must be taught and understood. Digital citizenship is mastered “when students recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they act and model in ways that are safe, legal, and ethical” (ISTE, 2022b, p.2). Storz and Hoffman (2013) encourage educators to “bridge the gap to build technological competence in student learners” (p. 4). These researchers mentioned that students are typically proficient with personal or social uses of technology, but struggle with technological skills for educational purposes, such as

evaluating information from internet research and word processing. Harris et al. (2016) also stress the value of best practices in teaching and learning for all students.

Encouraging educators to teach by modeling curriculum content and providing adequate practice first, then supplementing learning with activities supported by technology will encourage positive digital citizenship. To support a technology-rich classroom, and provide students with opportunities to use technology to enhance their educational experience and communication skills, teachers must inform their students about the purpose of technology for enrichment and communication, and how it is used for success.

As students expand on their exposure and capabilities of technology usage, this digital citizenship transforms into a more in-depth use of technology. As students become more proficient in information and communication technologies, such as spreadsheets, word processors, and online communities, digital literacy begins to emerge (Reddy et al., 2020). Digital literacy has been shown to have a positive impact on student performance; however, much goes into developing students with strong digital literacy skills (Tohara et al., 2021). Digital literacy is the ability for students “to use digital technology, communication tools or networks to locate, evaluate, use and create information, understand it and use information in multiple formats from a wide range of sources via computers and perform tasks effectively in a digital environment” (Reddy et al., 2020, p.83). It is important to add that the International Society for Technology in Education (2022) recommends that educators “endorse a culture that promotes critical examination of online resources and fosters digital literacy” (p. 2). Effective technology integration and classroom procedures that support digital citizenship and digital literacy are used by educators who feel confident in technology use, and understand how technology can be

used to support individual student needs; only then can the integration process thoroughly benefit student achievement (Harris et al., 2016; Picton, 2019; Santoro & Bishop, 2010).

Technology Benefits

When technology is thoughtfully added to a child's educational experience it has the potential to enhance students' learning outcomes. Through the use of technology, teachers have the opportunity to present enrichment, remediation, differentiate student experiences, and extend learning beyond the classroom. Technology integration in a classroom setting enhances students' engagement, motivates students to guide their learning, and communicate with teachers or peers.

A Student-Centered Approach

Successful educators differentiate academic skills along the literacy continuum to provide individualized reading and writing instruction (Burnett, 2010; ISTE, 2022a; Wilkes et al., 2018). Educators who can identify students' various needs and synthesize best practices in literacy instruction, course content, and digital technology "provide a rich and meaningful learning experience" (Hutchison & Woodward, 2014, p.458). Musti-Rao et al. (2015) found that "computers and technology do not teach but rather are vehicles through which instruction is delivered" (p. 196) and must be considered carefully. Effective technology use affords a student-centered approach by offering students the opportunity to experience academic content through non-traditional methods while receiving learning opportunities for developing or advancing literacy skills throughout the primary years (Altun, 2019; Macaruso & Walker, 2008). Effective educators who immerse their students in a computer-based learning environment may

utilize technology to present literacy instruction, provide opportunities for online research, utilize tools such as word processing, support collaboration with peers via personal devices, and provide supplemental literacy instruction based on individualized student needs (Altun, 2019; Hutchison & Woodward, 2014; Inan et al., 2010; Storz & Hoffman, 2013; Macaruso & Walker, 2008). Students who experience computer-based learning reported fewer whole-class lectures and more small-group opportunities related to their reading and writing skills. This computer-based experience has also enhanced student motivation, academic engagement, and student achievement in elementary classroom settings (Macaruso & Walker, 2008; Paratore et al., 2016; Scherer et al., 2017; Staples et al., 2005; Storz & Hoffman, 2013; Wilkes et al., 2020).

Student Engagement and Achievement

Integration of technology in the form of computer-assisted instruction and information and communication technologies are used to expand the ability of students to communicate with others and personalize their learning. Also, technology integration has been found to enhance student engagement and achievement in subject matter, allowing students of different abilities to meet the same academic goals (Picton, 2019; Hol & Aydin, 2020). Teachers interviewed by Picton (2019) mentioned that engagement with technological devices led to more positive learning experiences, enhancing their students' outcomes of the learning target. More specifically, Picton (2019) found that technology made a positive impact on children's motivation to read, enhanced their reading enjoyment, and improved their overall confidence. After interviewing teachers about their perceptions of technology integration in literacy instruction, Morphy and Graham (2018) found that teachers' use of word processing supported their students' writing by creating

a positive shift in student motivation, organization of writing, and the overall quality of the piece. These teacher perceptions propose that technology features provide their students with opportunities to stay engaged and successful within the literacy continuum.

Research conducted by Harris et al. (2016), Mitchell and Fox (2001), Santoro and Bishop (2010), and Wilkes et al. (2020) found that computer-assisted instruction supported student progress by informing students of learning objectives at the beginning of the task, offered multiple examples of the targeted skill, presented various opportunities to practice the skill, and required mastery of the skill before moving on. These researchers found that students moved more systematically through the literacy hierarchy. Additionally, Wilkes et al. (2020) reported that online programs that provide educators with an online dashboard listing grade-level literacy skills assessed during student use allow educators to more effectively provide students with enrichment or remediation of skills. Yildiz and Aktas (2014) and Anderson and Putman (2020) also identify active learning with technology as a benefit to students with special needs. Their research found that children can progress through the chosen content material at their own pace and it provides students with breaks if needed. Additionally, teachers expressed value in technology on the basis of flexibility “to make adjustments based on individual students’ needs, and provide accommodations that helped students compensate for their disabilities (Anderson & Putman, 2020, p. 42). Computer-based learning environments created a more enjoyable and self-guided learning atmosphere for the students (Hol & Aydin, 2020; Santoro & Bishop, 2010; Yildiz & Aktas, 2014). Much of the research provides educational benefits as a result of technology integration, but it must be effectively aligned with the overall learning objective or it will present challenges and

disadvantages. Results must be interpreted cautiously as not all implications are positive and supportive of student achievement.

Technology Challenges

When collaborating with educators, numerous educators have collected data based on teacher and student perceptions of technology integration. Findings indicate that teachers felt challenges in the area of time and classroom management when technology was involved (Harris et al., 2016; Yildiz & Aktas, 2014). Teachers voiced concerns about the time it takes for professional development opportunities to learn and understand the benefits of the technological features. It was also clear that some teachers had apprehensions related to the time needed to teach the technology to their students (Altun, 2019; McKenney et al., 2015). If teachers did not take time to teach technology features related to computer-assisted instruction or information and communication technologies, students' participation began to diminish and they were observed as highly distracted with a lack of progress and understanding of the content (Santoro & Bishop, 2010).

Further research conducted by Hull and Duch (2019) found that “one-to-one technology programs are an effective means to raise student achievement, however, there may be a short-term adjustment period before gains are realized” (p. 80). Nevertheless, research conducted by Harris et al. (2016) compared the results of student achievement and student motivation in classrooms with 1:1 technology integration to a classroom without it. The study found that although scores indicate that students with 1:1 initiative did well, it did not provide overall success for student achievement and motivation when compared to students who do not have access to a personal device. This information is troubling as there are little to no formal evaluation tools to determine the direct impact of

the 1:1 device on teaching and learning (Vu et al., 2019). The need for further research about the overall effectiveness of the implementation of a personal learning device is clear. Research may conclude whether additional time is an effective means to support positive student progress with a personal device. Jin and Schmidt-Crawford (2017) recommend a “more in-depth investigation of the factors that impact student academic outcomes” (p. 3) when implementing a 1:1 initiative. Factors such as parent involvement and teachers’ perceptions may support this research (Chang, 2016; Donovan et al., 2007; Jin & Schmidt-Crawford, 2017). Jin et al. (2017) gathered parental perceptions and determined that parental involvement had a positive impact on student’s overall academic success and emotional well-being, but when parents were interviewed about their perspective of the implementation of a 1:1 device initiative, fewer parents indicated a “positive change for motivation to do school work, interactions with students, and level of interest in classes” than expected (p. 7). Parents went on to state that the 1:1 initiative distracted their children, in and out of school, and it was difficult to monitor the device use, causing too much time on the screens (Jin et al., 2017). More work needs to be done in the area of the impact 1:1 devices have on overall student achievement.

Furthermore, classroom observations indicate that the integration of technology does raise challenges for teachers in a classroom setting. Liu’s (2016) teacher participants expressed difficulty with technology when the desired device was not set up correctly, on multiple occasions. Due to technology features becoming unavailable, educators had to rearrange their lesson plans and remove the enhancements for technology features; causing a shift in the desired method of instruction. Additional research conducted in elementary literacy classrooms by Harrell and Bynum (2018), McDermott and Gormley

(2015), and Ruggiero & Mong (2015) found similar outcomes to their observations. These studies observed that the opportunities to enhance lessons were lost due to hardware that was not properly prepared. To minimize these challenges, school district personnel need to provide educators with time to prepare effective technology integrations, maintain open communication with staff, and deliver applicable professional development opportunities.

Professional Development

Fullan (1982), an expert in change theory, stated that “educational change depends on what teachers do and think—it’s as simple and complex as that” (p.107). To obtain successful integration of technology, teachers must grasp effective teaching skills, have flexible teaching pedagogy, and be willing to adopt this new form of instruction (Bitner & Bitner, 2002; Chang, 2016; Howard et al., 2015). For educational change to occur, “teachers must be equipped with the skills to integrate technology seamlessly into their instruction in ways that move beyond mere presentation and communication to a place of creation, innovation, and problem-solving” (U.S. Department of Education, 2016, p.1). Ertmer (2001) proposes a manageable introduction to technology so teachers can explore practical methods for adding it into their classrooms. Simple, yet concrete, strategies that support a teacher’s current pedagogy will motivate teachers to utilize technology to enhance the students’ learning experience (Crompton & Sykora, 2021; Ertmer, 2005; Hermans et al., 2008). Professional development opportunities must meet teachers’ pedagogical needs, be individualized for a range of experiences, and be specific for use in a particular subject area (Bowman et al., 2022; Hilaire & Gallagher, 2020).

Elementary educators with strong pedagogy, thorough content knowledge, and adequate professional development for meaningful technology integration more frequently included technology and provided supplemental skills that enhanced student achievements during classroom instruction (Bowman et al, 2022; Ertmer, 2005; Harrell & Bynum, 2018; Hutchison & Reinking, 2011). As society and the workforce demand the use of technology for professional communication, research, and social interactions, it is recommended that teachers alter their methods of literacy instruction with the use of technology; as it was found to provide “students an outlet for more creativity” which led to increased engagement and motivation (Storz, 2013, p. 8). However, a major barrier to the implementation of technology is a teacher’s technology self-efficacy. Researchers, Lee and Tsai (2010) and Sherer et al. (2017) found that teachers’ confidence regarding technology use was a major predictor of their willingness and ability to integrate technology. Educators who placed a more positive value on technology were observed to use it more frequently in their classroom, as their perceptions of the effectiveness of technology-supported their students’ achievements.

The process of integrating technology into classrooms has been ongoing among administrators and educators for the past three decades (Ertmer et al., 2012). The National Association for the Education of Young Children (2012) recommends the use of technology in the classroom and it must be used wisely to “optimize the potential for child’s learning and development” (p. 1). Research has shown that the number one indicator of the success of technology integration is the teacher’s knowledge of what, how, and why the technology will be used (Ertmer, 2005; Ruggiero & Mong, 2015; Spiteri & Rundgren, 2020). However, the ability to master those three skills

simultaneously is challenging among educators. According to Mishra and Koehler's (2006) technological pedagogical content knowledge framework, skillful educators require growth in three areas of their teaching practice: content knowledge, pedagogical knowledge, and technological knowledge. Content knowledge is an educator's knowledge of the subject matter and pedagogical knowledge is the knowledge of best teaching practices for the subject area. Technology knowledge refers to an educator's knowledge about multiple technology devices such as interactive whiteboards, digital video, and the internet. Administrative staff must consider a quality professional development program that engages each teacher's content knowledge, pedagogical knowledge, and technological knowledge. Synthesizing them together will support stronger technological pedagogical content knowledge (Hutchison & Woodward, 2014; Mishra & Koehler, 2006; Scherer et al., 2017).

Research has indicated there are many experiences to expand an educator's technological pedagogical content knowledge, but one must keep in mind that technological pedagogical content knowledge "is not static or fixed, but a dynamic and flexible body of knowledge influenced by both rapid changes in technology and the bidirectional relationship between knowledge and practice" (Mouza et al., 2014, p.212). Also, it is important to note that participants involved in a successful professional development session, prepared to enhance technological pedagogical content knowledge, must be engaged through active participation to develop a thorough understanding of the application tools. Lawless and Pellegrino (2007) proclaim that this provides educators the opportunity to take ownership of technology features and increase self-efficacy with the integration of the devices.

Hermans et al. (2008) present their theory that a teacher's beliefs "about the practice of teaching are significant determinants in explaining why teachers adopt computers in the classroom" (p. 1506). Their study found that teachers who had traditional beliefs about teaching show a negative impact on the classroom use of computers. These scholars, along with Bowman et al. (2022) stress the importance of peer modeling and communications about technology for individuals who display a traditional teaching pedagogy. In addition to a traditional viewpoint, the educators in each study shared similar beliefs about how students learn, personal confidence levels, and the perceived value of technology (Bowman et al., 2022; Ertmer et al., 2012; Hermans et al., 2008). Bowman et al. (2022) found that improving teachers' abilities and beliefs by viewing technology in use were the most impactful form of professional development. Mentorships, open communication, and time to reflect will support traditional educators' mindsets and encourage change to adapt to this innovative teaching approach.

Professional Development for Technology Integration

Although the demand for technology use in classrooms is on the rise, many scholars have found an absence of differentiated professional development based on individual teachers' needs for technology integration in their literacy classrooms (Bowman et al. 2022; Clark & Boyer, 2016; Hutchison & Reinking, 2011; Kim et al., 2013; Odajima, 2019; Spiteri & Rundgren, 2018). More specifically, Hutchison (2012) interviewed literacy teachers to gain their perceptions of technology professional development related to their core content of English language arts. Her research concluded with "nearly all (81%) of teachers reported that they have not received adequate professional development about how to integrate digital technology into their

literacy instruction” (p. 43). Unfortunately, there is limited research related specifically to professional development options that support technology and reading instruction.

Research that focused on successful professional development opportunities that positively impact technology integration for reading instruction has been conducted by Bowman et al. (2022), Hutchison (2012), Hutchison and Woodward (2018), Lawless and Pellegrino (2007), and Wake and Whittingham (2013). This group of scholars identifies mentor teachers or professional learning communities, supportive administration, and time for preparation as beneficial tools to support teachers who integrate technology into reading instruction. Nevertheless, these studies did not specifically mention how these options directly benefit a student’s reading or writing ability. Research warrants the need for professional development opportunities that specifically address reading instruction with technology integration. Additionally, there is limited research that directly relates the role of professional development and its impact on writing development.

Scott and Mouza (2007) felt as though traditional forms of professional development in the area of teaching writing have been found to feel “disconnected from practical application, the classroom or the subject matter” (p. 232). To use technology to enhance writing instruction in elementary-aged students, Paratore et al. (2016) suggest three non-negotiable items for teacher professional development. First, teachers should engage in “evidence-based literacy development and instruction” (p. 250). A teacher must understand the content standards of writing and specific lesson objectives before lesson development begins. Hutchison & Woodward (2014) highlight the importance of educators asking themselves whether the lesson provides the students with an opportunity to learn the writing context both digitally and nondigitally. Only then will the educator be

able to create a lesson that applies technology to enhance the student's ability to utilize technology accurately when writing (Lovell & Phillips, 2009). Next, Paratore et al. (2016) emphasize that educators must be provided the opportunity to observe their peers using computer-assisted instruction or information and communication technology as a tool to enhance writing development in the classroom setting. This peer modeling provides students with visual expectations of technology integration as a means to enhance their writing. Finally, it is suggested by Paratore et al. (2016) and Darling-Hammond et al. (2017) that teachers are provided with adequate amounts of time to prepare evidence-based literacy lessons that effectively integrate technology into the writing curriculum. The additional time provided to educators offers an increased number of opportunities for teachers to collaborate and reflect on their lesson objectives.

Professional development options that provide educators with experience in teaching writing multimodally expand on the notion that writing can be done in various forms, which provides students with the opportunity to produce writing as a means to communicate through a more "interactive, participatory and collaborative approach" (Edwards-Groves, 2012, p. 3). Additionally, Burnett et al. (2006) and Schmidt (2019) discovered that when teachers utilized multimodal writing instruction it altered the way children wrote, encouraged interpersonal interactions with peers, enhanced writing creativity, and expanded upon the kinds of texts the students produced.

Teacher Mentors for Technology Support

A quality professional development experience promotes change in teachers' beliefs about their current teaching pedagogy (Bowman et al, 2022; Guskey, 2021; Koh & Divaharan, 2011). Ertmer (2005) suggests strategies for administrative personnel to

encourage change in an educator's pedagogy related to technology integration. The most impactful form of professional development for technology integration was not a workshop model, but a mentorship program where teachers worked with a knowledgeable colleague about technology techniques (Ertmer & Ottenbreit-Leftwich, 2010; Kopcha, 2012; McKenney et al., 2015; Penuel, 2006). This recommendation is rooted in areas of "personal experience and vicarious experiences" (p. 32). Personal beliefs are grounded in personal experiences, and Ertmer (2005) indicates that facilitating mentor teachers for peer observations to witness successful technological approaches may support inexperienced educators in adopting new teaching practices. Mentor teachers are identified as individuals who felt comfortable implementing technology into instruction, communication, or as individualized remediation (Koh & Divaharan, 2011). A successful mentorship program reinforces collaboration with colleagues and time for teachers to witness models of effective teaching practices. Data shows that teachers thought the process "promoted positive beliefs about technology and these beliefs grew stronger as a result of their mentoring relationship" (Kopcha, 2012, p. 1118). Additionally, professional learning communities have been found to support educators when integrating technology into a classroom. Hutchison and Woodward (2018) found that these small groups of educators gave professionals time to share and discuss barriers and work together to plan instruction. Furthermore, research conducted by Minicozzi (2018) and Ruggiero and Mong (2015) suggest that providing teachers who have less experience using technology with a mentor will provide these teachers with ongoing support, resulting in positive self-efficacy to execute technology in a classroom. Clark and Boyer (2016), Ertmer (2005), and Koh and Divaharan (2011) more specifically

identify the importance of personal and vicarious experiences with mentor teachers. This group of researchers reinforce the benefits of supervising teachers who promote the use of technology through modeling effective technology tools for less experienced teachers.

After building awareness with a mentor, Bowman et al. (2022) found teachers were more willing to integrate technology into their students' day. The mentorship option provides a live model that has been observed to build the mentee teacher's confidence and ability to integrate technology successfully into a lesson (Clark & Boyer, 2016; Ertmer, 2005; Koh & Divaharan, 2011). Over time, Top et al. (2021), found through personal interviews, both the mentor and mentee teachers benefit from this style of professional development because it provided an opportunity for reciprocal support. Similar findings identified support from colleagues and mentors to be more beneficial to teachers than simply learning the device techniques during professional development sessions (Avci et al., 2019; Clark & Boyer, 2016; Ertmer, 2005; Koh & Divaharan, 2011; Lawless & Pellegrino, 2007). In addition to mentorship programs, professional development options that have been found to provide educators with a positive impression for the purpose of integrating technology are open administrative communications and time to reflect on the use of technology (Hilaire & Gallagher, 2020; Keengwe & Onchwari, 2009; Raman et al., 2019).

Administrative Support

For a smooth and impactful transition to technology integration within elementary classrooms, administrative staff must consider teachers' technology concerns, ability levels, and current uses of technology, all while keeping an open form of communication (Berrett et al., 2012; Guskey, 2002; Hermans et al., 2008; Raman et al., 2019; Storz &

Hoffman, 2013). An administrator who recognizes technology concerns, teachers' ability levels, and the need for open communication "combined with competent leadership, makes the difference between success and failure of an innovational implementation" (Berrett et al., 2012, p. 200). Additionally, Raman et al. (2019) stated that a principal's role "requires them to become technology leaders so that they can spearhead the embracing of the inevitable and ever-transforming digital era" (p. 424). Administrative staff must make it a priority to ask teachers questions about the need for the use of technology (Mong, 2015). Allowing educators to develop an open dialogue stating concerns with the implementation process provides administrative staff the ability to plan and apply professional development opportunities to support these concerns and diminish an educator's internal barriers. Fundamentally, this process has the potential to enhance a teacher's willingness to accept this new pedagogy.

Effective communication must be mutual between the teaching staff and administrative staff. In addition to listening to and supporting educators with their concerns, effective administrators provide an open dialogue with their staff. It is just as important for the administrative staff to willingly articulate the purpose of technology integration and lead by example (Berrett et al., 2012). Leading by example shares an impactful message about the school's vision and purpose for technology integration. Berrett et al. (2012) interviewed administrators and found that this particular group of administrators were not sharing the district's vision for technology use. The participants in this study communicated information with other administrators and voiced that they did not see any "value in talking about the implementation of the project" to the teachers (Berrett et al., 2012, p. 214). This was identified as problematic because "one of the

primary roles of the school leadership is to support teachers and create a shared vision for technology use” (Ertmer & Ottenberit-Leftwich, 2010, p. 275). The teachers in this study were frustrated at the lack of communication and shared their hesitation to implement a new teaching pedagogy. Administrative staff must be willing to learn about their staff’s needs, provide a shared vision for technology integration, and acknowledge that every teacher will require training that meets individualized needs.

Research conducted by Spiteri and Rundgren (2018) advocates for teachers that require adequate skill instruction before effective technology implementation. However, teachers demonstrate a range of abilities when utilizing technology. Spiteri and Rundgren (2018) recommend professional development experiences that are differentiated to support the scope of educators’ technology knowledge. Technology professional development that has been adapted to provide support for various needs has been found to enhance a teacher’s instruction; which positively impacts student acquisition of subject matter and promotes higher-order thinking skills during academic tasks (Burnett, 2010; Clark & Boyer, 2016; Spiteri & Rundgren, 2018; Mong, 2015). One way to adapt professional development experiences was shown in a study conducted by Mazzella (2011) where educators were asked to determine their skill level based on six levels of implementation. Here, the levels addressed beginning technological skills like “teachers have begun using technology for instruction, but usage is uneven as they have not mastered all components” to more advanced skills that recognize teachers “exploring ways of refining their use of technology to increase the impact on students” (Mazzella, 2011, p. 47). This method supported nearly 60% of teacher respondents who reported an increase in differentiated activities and 54% of teacher participants reported increased use

of computer-based learning activities (Mazzella, 2011). To support this notion, Avci et al. (2019) found that professional development was more successful in supporting teachers' needs when the teachers were involved in the decision-making process in planning professional development. The options were learner-centered, providing more targeted skills and practice. Teachers require the skills necessary to implement technology, but they also require "the right attitudes and knowledge on how to apply these skills" in their classrooms (Spiteri & Rundgren, 2018, p. 124). Administrative staff should be proactive in sharing a common vision for technology use and keep an open dialogue to support teachers during the implementation process by providing teachers with time for self-reflection.

Time for Self-Reflection

Collaborative communication between administration and educators is fundamental for the improvement of technology integration and its impact on student achievement. Bitner and Bitner (2002), Keengwe and Onchwari (2009), and Kim et al. (2013) discovered a reoccurring theme throughout their research. These scholars interviewed educators who made an argument for the need for more time for self-reflection. Kim et al. (2013) described reflective sessions for teachers with administrative personnel as a tool that reinforced the significance of a computer-based learning environment and differentiated instruction using technology. Kim et al. also confirmed the importance of time used to reflect on teaching practices that were successful or unsuccessful. McKenney et al. (2015) support this suggestion that the reflective work done after the professional development session is considered just as important as the professional development sessions themselves. McKenney et al. (2015) assert that

“teachers rarely have opportunities to further develop the expertise required for establishing the broader foundations of design work” (p. 13); particularly, teachers require time to establish themselves in the area of creative lesson planning, and reflection, for a successful computer-based learning environment. The evidence in the research states that teachers require more than just a demonstration of the technology. The teachers need practice, feedback, and ongoing support (Bitner & Bitner, 2002; Guskey, 2021; Harrel & Bynum, 2018; Kim et al., 2013; McKenney et al., 2015).

High-quality professional development provides teachers with adequate time for task and reflection, is relevant to personal needs, promotes collaboration with peers, and has a clear mission for student achievement (Donovan et al., 2007; Lawless & Pellegrino, 2007; McKenney et al., 2015; Raman et al., 2019). This is manageable for administrative staff who share a vision for achievement and provide teachers with productive personal growth opportunities. Overall, the goal of any professional development experience related to technology is to enlighten educators with a variety of tools to support and expand upon their current pedagogy and enhance their self-efficacy in the use of technology, however, with this implementation, barriers arise.

Barriers to Successful Implementation

In many studies, barriers to the integration process have hindered the success of technology use in classrooms. “Barriers are defined as any factor preventing or restricting teachers’ use of technology in the classroom” (Brinkerhoff, 2006, p. 22). More recently, with current trends and demands for technology, common barriers seen in the past, such as a lack of resources and lack of availability, have since been minimized (Hilaire &

Gallagher, 2020), but many barriers such as a lack of time, adoption of a new tool and inadequate self-efficacy among educators remain.

The first barrier to mention is time. Teachers interviewed in numerous studies voiced concern about time to plan and practice the skills needed for implementation (Lawless & Pellegrino, 2007; Kopcha, 2012; Spiteri & Rundgren, 2018). A common statement in research interviews conducted by Kopcha (2012) was “the professional development really helped, but I still really need time to practice” (p.1116). Unfortunately, time cannot be added to a school day, but time designated for collaboration, reflection, and mentorship programs have proven to be successful for teachers (Spiteri & Rundgren, 2018).

Additionally, Spiteri and Rundgren (2018) found teachers who thought it was unnecessary to adopt new tools when their previous lessons were already effective. These teachers expressed difficulty accepting new technologies for use within their current teaching pedagogy. Donovan et al. (2007) had a similar finding – accepting new technologies can be especially difficult for teachers. Their research adds that teachers felt “uncomfortable with the prospect of modifying their existing practices and making accommodations for teaching in a 1:1 environment” (p. 277). These teachers noted that they most frequently used word processing and searching the internet as technology features in their classrooms (Donovan et al., 2007), low-level skills that do not enhance a student’s progress.

Findings by Butler and Sellbom (2002), Dinc (2019), and Kopcha (2012) address factors that negatively affect the implementation of technology in primary grade levels, and these factors are knowledge of best practices with the technology and whether the

technology enhances student understanding. Each study noted a significant point about teachers' self-efficacy. The scholars pointed out that if teachers do not have adequate technical knowledge, and lack self-efficacy, they most likely will produce low-level tasks, such as practice drills or reward activities for students which limit engagement and academic achievement (Butler & Sellbom, 2002; Dinc, 2019; Kopcha, 2012). Ertmer et al. (2012) and Howard et al. (2015) added that a teacher's own beliefs toward the relevance of technology is a barrier to a student's academic success and needs to be addressed first and foremost during the implementation process; only then will a teacher become motivated to establish a computer-based learning environment. Teachers who have substantial technological pedagogical content knowledge and understand the integration of digital technology as a tool for students to make sense of the content, will produce stronger student understanding and demonstrate progress in student achievements (Altun & Akyildiz, 2017; Koh & Divaharan, 2011; Scherer et al., 2017).

Summary

Simply providing teachers with updated modes of technology for use in their classrooms does not guarantee improvement in students' academic outcomes (Hutchison, 2012; Paratore et al., 2016). Kervin and Mantei (2010) made a strong statement in their research for the need of teachers who have deep roots in strong pedagogical content knowledge: "technology is no substitute for informed lesson design and good classroom practice" (p. 80). A teacher with strong technological pedagogical content knowledge who can identify the curriculum goals, assess student understanding, and determine a purpose for the technology integration will advance student achievements tremendously.

There is a strong relationship between student literacy progress and teachers' professional development as it is associated with technology integration in the classroom.

Research is limited in this area of professional development and literacy achievement. Successful teacher training will result in changes to an educator's pedagogy, which positively impacts students' learning outcomes (Darling-Hammond et al., 2017). Professional development opportunities must break down known barriers, be easily implemented within the current curriculum, and be suitable for every teacher's background knowledge. Elementary educators must utilize technology as a transformative learning tool and guide students during their usage so it can be of service to the curriculum (Paratore et al., 2016). To do so, educational administrators play a key role in guiding teachers' knowledge and must provide teachers with four essential domains presented through professional development. The four domains are time to prepare for technology integration, communication and collaboration with knowledgeable peers, a clear vision of success, and differentiated professional development experiences. It is recommended that all four domains be present while receiving ongoing support and feedback from the administration or peers (Hutchison, 2012; Lawless & Pellegrino, 2007; Spiteri & Rundgren, 2018).

The abrupt change to learning environments, due to the COVID-19 pandemic, thrust teachers and students into alternative forms of education, resulting in an educational revolution for our future (Reich et al., 2020). Effective computer-assisted instruction and information communication technologies supplement classroom instruction, provide scaffolded practice and deliver immediate feedback to augment a sense of accomplishment in the student (Lovell & Phillips, 2009). The most impactful

experience for educators during professional development is one that alters a teacher's pedagogical content knowledge and reflects a deeper change in self-efficacy, diminishes personal barriers, and opens an opportunity for change. Wake and Whittingham (2013) make a great point when saying that technology has evolved into an experience that develops student learning; technology is no longer a tool to deliver a better lesson. Additionally, Guskey (2021) stressed the importance of a variety of professional development activities that are embedded in the job such as collaborative planning, curriculum development, structured observation, peer coaching, and mentoring. Elementary educators are at the forefront of literacy instruction and technology integration, it is important to understand their perspective on technology integration and the role professional development has on their ability to support the development of student learning. We have yet to discover this. The methods of this current study exploring teacher perceptions and technology implementation are defined in Chapter Three.

Chapter Three – Methodology

The purpose of this qualitative research study was to understand teachers' perceptions of the value of technology integration into their literacy instruction, perceptions of their own technological pedagogical content knowledge, and to determine the role of professional development in the implementation of technology in elementary literacy classrooms. With increasing demands for teachers to use various technologies during literacy instruction, and to provide opportunities for students to interact with devices to enhance the learning process, it is imperative that educators receive adequate professional development related to this technology integration (Pilgrim & Martinez, 2013). A teacher's knowledge of technology and curricular content are the most influential indicators of technology integration into literacy instruction. Identifying current barriers to technology integration in elementary literacy classrooms is important to ensure professional growth in technological pedagogical content knowledge (Paratore et al., 2016).

This research study used a qualitative approach by utilizing an online survey and personal interview. Creswell and Poth (2021), scholars of qualitative inquiry, believe the qualitative research approach provides the investigator with a strong understanding of the research which ensures the reliability of the data collection. This chapter outlines information about the participants, methods, and procedures used to understand teachers' perceptions of technology when considering it to enhance literacy instruction, to make connections to the participants' technological pedagogical content knowledge, and the role of professional development to support technology integration for literacy instruction.

Setting

The research for this study was conducted in southeastern Pennsylvania within suburban public education school systems. These school districts range in size from 1,500 to 5,000 students. For this study, the two school districts utilized have elementary schools that consist of students in grades K-5. Students in each school district experience a 1:1 implementation that provides a personal device, iPad, or Chromebook, to each student. The teacher participants of this study have a range of teaching experience and indicated their years of service in the demographic section of the survey.

Subjects

The participants in this research study were elementary classroom teachers who educate students from kindergarten through fifth grade. The subjects work in suburban public schools and were responsible for implementing a literacy curriculum language arts. Also, during this research study, these educators had access to 1:1 technology for their students. Voluntary participants in this study work in kindergarten through fifth-grade classrooms and they indicated this, along with their years of experience teaching this grade level, on the demographic questions within the survey. Overall, 29 educators responded to the survey and five people were interviewed to gather data based on technology integration.

Instruments

The instruments used for this study were a researcher-designed online survey (Appendix A) and interview questions (Appendix B). The online survey contained 34 questions. The first question asked volunteers to agree to the terms of the research and

provide the researcher with consent. The next three questions gathered demographic information of each participant. The remaining 30 survey questions were multiple-choice and Likert-scale statements that focused on teachers' perceptions of their own literacy instruction, technological knowledge, and experiences with professional development opportunities related to technology integration. Surveys were distributed via email, by consenting superintendents or administrative personnel, to active elementary classroom teachers in all participating school districts using the Survey Monkey online platform.

Data collection through an electronic survey provided many benefits to the researcher. Wright (2005) provided readers with the advantages to data collection using a survey by stating that the researcher has the ability to reach a broad range of subjects that may not be accessible without online access. It was also recommended that online surveys allow a researcher to save time when contacting subjects and tend to be inexpensive to the researcher. In order to elaborate on the survey data, the researcher of this study utilized personal interviews to further discuss teacher perceptions of the value of technology integration, their technological pedagogical content knowledge, and the role of technology professional development. As suggested by Hobson and Townsend (2010), the researcher should be aware of the subject's body language during personal interviews, as this provides valuable information for the study as well. For the personal interview, there were five pre-set questions that were asked to all participants.

Survey

The survey contained one question for consent, three demographic questions, five multiple choice questions, and 24 Likert scale statements that utilized a four-point choice option ranging from *strongly agree* to *strongly disagree*. All survey responses were

collected electronically through Survey Monkey. The purpose of the Likert Scale was to determine the attitude or opinion of each participant based on their experience teaching literacy content. The Likert Scale controls the participant's level of agreement with each response in order to gather specific data focused on the research questions (Likert, 1932). The forced format of a Likert-Scale does not allow participants the option to select *no response* which will increase the number of functional data points for analysis by the researcher (Lavrakas, 2008).

The online survey was developed to align with the three research questions and related research. Survey questions 5, 6, 7, 10, 11, 12, 13, and 14 were included to focus on responses to research question one; survey questions 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25 were created to prompt responses to research question two; and survey questions 8, 9, 26, 27, 28, 29, 30, 31, 32, and 33 were intended to promote responses for research question three. Each participant was provided a link to the survey via an email sent by the consenting superintendent or administrative personnel. The participants were asked to consent to participate in the research study, then complete the online survey using the platform Survey Monkey.

When designing the study, the researcher began by utilizing a team of professionals who reviewed the survey questions to ensure they were clear and supported the three essential research questions. Next, a team of educators field-tested each survey question before it was presented to the Research Ethics Review Board (RERB) for review. When considering the validity of the instruments used for data collection, Creswell and Creswell (2022) suggest that the researcher utilize a team of professionals who will field-test the survey. For each survey question, the team of educators

determined the degree to which it satisfactorily addressed the corresponding research question. Questions within the survey that met the requirements for satisfaction received a score of three. Questions that were satisfactory but needed minor adjustments received a score of two. A score of one was given to any question that was unsatisfactory and did not relate to a research question. All questions were edited and scored repeatedly until each received a score of three, indicating that it was directly aligned with the research study.

Before beginning the survey, the participant was informed that all responses would be kept anonymous. The researcher did not ask the participant to indicate their name in the survey. Data collected from the survey and interview did not include names or school district information in any form. When teacher participants completed the survey, they were provided with a link to send their contact information to the researcher to volunteer for a follow-up interview.

Interview

At the conclusion of the survey, participants were given the opportunity to provide their personal information to permit the researcher to contact them for a follow-up interview. Interviews provided the researcher with more information related to the integration of technology into the literacy curriculum for students in grades kindergarten to fifth grade. Interviews provided participants with an opportunity to expand on their responses given during the survey (Hobson & Townsend, 2010). The researcher utilized semi-structured interviews to augment data found in relation to technology integration, the connection to teachers' technological pedagogical content knowledge, and the role of professional development. These semi-structured interviews had five set questions that

were asked to every teacher participant but were open-ended to provide a more conversational dialogue (Hobson & Townsend, 2010). This partly-structured format provided the researcher with predetermined questions that supported a framework for data collection while also providing a comfortable environment for the interviewee.

Participants who provided personal contact information were emailed by the researcher to schedule a personal interview. Within this communication, and before the interview took place, participants were sent a consent letter that displayed information about the interview procedures. All interviews have been kept confidential. The interviews were conducted using the options of online video platform, phone calls, or in-person. Four interviews were in-person and one interview was completed over the phone. Each interview was transcribed and recorded by the researcher with the participant's consent. No personal information about the participant was stated for transcription, and personal information was not added to the researcher's notes.

The interview consisted of five open-ended questions that were aligned with the research questions. The interview explored more specific information related to teachers' perceptions of the value of current technology integration methods and professional development experiences to support literacy instruction in elementary classrooms. Interview question number three directly reflected the first research question. Interview questions one and two aligned with the second research question. Finally, interview questions four and five supported the third research question. As with the survey questions, the interview questions were reviewed by the team of professionals first. Next, the interview questions were field-tested by a panel of teaching professionals before they were presented to the RERB. Each question was given a score of one through three to

indicate the degree to which it was satisfactory. Any question that received a rating of two or below was revised until the team of teaching professionals rated the question at the highest satisfactory level. This process follows Creswell and Poth's (2017) recommendations to ensure the reliability and validity of the data in that each survey question aligns with the research questions.

Validity and Reliability

Research for this study utilized multiple sources of data in the form of survey and interview responses from current elementary school teachers. The research questions were addressed by the survey and interview questions, and each question was field-tested by a panel of educational experts to ensure validity and reliability. This group of professionals focused on the clarity of each survey and interview question and how they directly related to each research question. Creswell and Poth (2017) recommend this practice to ensure that the data are valid and reliable. It is important to note that the educators who worked on the panel of professionals did not participate in the study. Following a review of all survey and interview questions, the group of non-participants provided feedback to the researcher so necessary modifications could take place. If a question scored a three, it did not need alterations. If a survey or interview question received a score of two, slight modifications were made. If the panel scored a question as a one, it required further analysis and was changed to meet the score of satisfactory rating. Once all questions were reviewed and amended, they were presented to RERB.

Qualitative research through the use of surveys and interviews, as explained by Creswell and Creswell (2022), support the validity of the study because they allow the researcher to gather the perspectives of the professionals in their natural environment.

This form of data collection also provides the researcher with the experiences and perceptions of the volunteers which present an array of data that closely relates to the realities of the participants. Additionally, for the validity of the research, survey participants were kept anonymous by submitting their responses through Survey Monkey. Within Survey Monkey, participants were not asked to identify themselves by name, only demographic information such as years of service, current grade level, and years teaching this grade level. Before beginning the survey, participants were informed that they may choose to skip a question or stop the survey at any time, with no consequences.

Interview participants were informed that all personal information and responses would be kept confidential by use of individual codes assigned by the researcher. Each code was labeled I1, I2, I3, and so on, based on the date the participant was interviewed. The researcher followed these procedures consistently to ensure the reliability of the data (Creswell & Poth, 2017). Data transcribed during the interview has been filed on a personal laptop and only viewed by the researcher. Before each interview, the participants were reminded that they could choose to skip or stop an interview question at any time, with no consequences.

Design of the Study

This qualitative research study was designed to gather the perceptions of elementary educators about the value technology integration has on their literacy classrooms. Elementary educators across two suburban school districts in southeastern Pennsylvania were asked to complete a survey in the form of multiple choice and Likert Scale responses. The questions and statements presented in the survey related to teachers' perceptions when considering the value of technology integration and perceptions of their

own technological pedagogical content knowledge during literacy instruction.

Additionally, the survey responses provided the researcher with insight into the role of technology professional development for purposeful classroom integration.

Upon completing the survey, participants were given the opportunity to volunteer for an interview with the researcher. Participants willing to participate in a personal interview were asked to submit their name and email for further contact from the researcher. Based on these responses, personal interviews were conducted at a mutual time and meeting location to enhance the research data (Creswell, 2021). Interview questions were developed to encourage teachers to share more in-depth teaching experiences and perceptions of their own technological pedagogical content knowledge related to the use of technology for instruction. The interview allowed for an open discussion with each educator as they were asked five questions and encouraged to share their personal experiences. In order to ensure the anonymity of the interview participants, each was assigned a random code and no personal information was shared. The codes were labeled as I1, I2, I3, etc.

Data taken from the survey and interview was coded into common themes and analyzed by the researcher. A report of all findings was sent to the participating school districts and may be used to guide future professional development opportunities in the area of technology integration in elementary classroom settings.

Procedure

At the beginning of the research study, superintendents were provided a letter explaining the purpose of the research and steps that were to be used to ensure anonymity

and confidentiality of all participants. This information was used to gain written permission for the study to be conducted within their school district. Then, upon receiving permission from the superintendent through an official letter, a panel of experts reviewed the essential questions, the survey, and the interview questions. This panel provided the researcher with feedback to ensure intelligibility of all questions. Next, a field test of all survey and interview questions was completed by a team of three educational professionals. This team recommended all changes necessary for clarity in the survey and interview questions. The researcher completed all modifications needed. Once each question passed the field test with a score of three, indicating a satisfactory review, the researcher began the approval process with the Immaculata University RERB to ensure all participants' rights were protected throughout the study.

Upon receiving approval from RERB (Appendix C), the Survey Monkey link, and introductory email, were sent to consenting school district personnel via email. The district personnel then sent the introductory email and survey link (Appendix D) to all elementary teachers in the participating school districts working in grades kindergarten to fifth. This email stated the purpose of the study, consent to participate, confidentiality procedures, and the researcher's contact information. The online survey was accessible to teachers for three weeks.

At the conclusion of the survey, participants had an opportunity to volunteer for a personal interview with the researcher. A Google Form was provided to enable participants to provide contact information directly to the researcher. The link did not allow the researcher to connect survey responses with interview subjects. Therefore, the process ensured confidentiality and anonymity to survey responses. After personal

information was received, the researcher contacted willing volunteers and provided the information letter and consent for an interview (Appendix E). To ensure confidentiality, each educator who participated in the interview was coded as follows: I1, I2, I3, etc.

Once a signed consent form was received via email or in person, the researcher scheduled a personal and confidential interview with the participant on an agreed-upon date and time. The interviews were conducted over a three-week period that immediately followed the three-week period the survey was open. Two days before the scheduled interview, the researcher sent the five interview questions to the participant. These five questions remained the same for all participants; however, follow-up questions were necessary to elicit further information or additional teacher perspectives. An opportunity to respond to open-ended questions encouraged more natural opinions and experiences of the participants (Hobson & Townsend, 2010).

Before the interview began, the researcher gained verbal consent from the volunteer to transcribe and record the interview. Interviews lasted approximately 20-25 minutes. Within 24 hours of the interview, a transcript was sent to each participant to ensure accuracy. The researcher considered any feedback from the interview participant.

For anonymity and confidentiality, survey data was not recorded in any way to associate participants with their responses. Data collection did not include the names or personal information of any volunteers. Additionally, findings did not report participant names or any reference to schools or districts.

Upon completion of the survey and interviews, the results were analyzed. Common themes and patterns were identified and connected to each research question.

This data has been presented in Chapter Four. This data analysis has also been shared with consenting school districts. The summarized findings have provided school districts with teachers' perceptions of the effectiveness of technology integration in their literacy classroom, educators' beliefs of their self-efficacy for technology use, and the role of professional development in these areas.

All data has been stored in a fireproof safe in the researcher's home and will be for five years. Data collected electronically has been stored on a password-protected computer. At the conclusion of the data collection and analysis, the researcher saved all information to a flash drive, and data on the researcher's personal computer has been deleted, followed by permanently emptying the computer's trash can. This flash drive has been stored in a fireproof safe within the researcher's home.

Data Analysis

Based on recommendations made by Creswell and Creswell (2022), the steps suggested for data analysis for qualitative research were completed as follows: compile the raw data, organize data for review, read the data and code it into common categories and themes, advance the themes into narrative form and interpret the data to report the findings. For this study, the data was collected and organized based on the three research questions. The themes that arose in the data were organized in narrative form and interpreted to draw conclusions from the findings. Narratives and tables have been used to represent these findings.

Creswell and Creswell (2022) identify that qualitative research supports the researcher in establishing overall themes, resulting in a deeper understanding of the

participants' perceptions. After all data were collected, the raw data from the survey were collected by the researcher and stored on a personal device. Transcriptions and recordings of each interview have been stored, organized, and summarized by the researcher. Creswell and Creswell (2022) suggest the interview recordings be shared with the participant to allow time to reflect and check for accuracy. Each interview participant received a typed transcription of the interview within 24 hours of completing it. The researcher asked each interview participant if they would like to add, change, or remove any part of the transcribed data. This provided the educator time to review the interview and contact the researcher with any revisions or clarifying points if needed.

Next, the researcher gathered commonalities among the multiple-choice questions and Likert statements and added them to an Excel spreadsheet. The researcher prepared the survey questions so that each question would reflect the three main focus questions. This allowed the researcher to analyze the organized information based on the strength of participant agreement or disagreement with specific data perspectives. Upon completion of the interviews, the researcher considered themes initiated by each and drew conclusions that address the three research questions. The combination of survey responses and interview feedback provided the researcher with an abundance of data to examine trends in technology integration for elementary teachers who teach literacy content (Creswell & Creswell 2022). Data provided the researcher with information about teachers' perceptions of the value of technology integration and the impact on student achievement in literacy classrooms, educators' perceptions of their personal technological pedagogical content knowledge, and the role of professional development experiences for

proper technology integration. The findings have been represented in narrative form within Chapter Four.

Summary

This qualitative study utilized an online survey and personal interviews to understand the perceptions of elementary educators related to integrating technology into their literacy curriculum. Data was compiled using a survey and interview, in the form of four demographic questions, five multiple-choice questions, 24 Likert-scale statements, and five personal interview questions. This chapter provided an overview of the subjects, setting of the study, instruments utilized, procedures of the study, and steps taken for data analysis. Data from this qualitative research study has been used to examine teachers' perspectives on the role of professional development opportunities as it relates to their technological pedagogical content knowledge and integration of technology in their literacy classrooms.

Elementary school teachers from school districts in southeastern Pennsylvania will remain anonymous throughout this research study and publication. Results from the online survey and personal interviews have been examined and organized into themes from the teacher responses. The themes found throughout the research were organized using an Excel spreadsheet. All data has been reviewed and organized, findings are summarized and expanded upon in Chapter Four and Chapter Five.

Chapter Four – Results

This qualitative study aimed to investigate teachers' perceptions when considering the value of technology as it is used to support literacy instruction and perceptions of their technological pedagogical content knowledge. Additionally, this research study explored current kindergarten through fifth grade classroom teachers' perceptions of the role of professional development used to support the implementation of technology in elementary literacy classrooms. With the increased demand for technology integration and digital literacy for students, educators need to understand and utilize technology in their lessons and for individualized instruction. The perspective of current educators will provide a unique component for understanding challenges and successes during a time when students have access to their own personal learning devices. This chapter will provide an analysis of data organized into three sections based on the three research questions.

The researcher collected current teachers' perceptions from two school districts in southeastern Pennsylvania and focused on kindergarten to fifth grade elementary classroom teachers. There were 29 participants who consented to complete a researcher-created survey via SurveyMonkey, which included four demographic questions, five multiple-choice questions, and 24 Likert-scale statements (Appendix A). The Likert-scale statements included items in which participants selected if they *strongly agreed*, *agreed*, *disagreed*, or *strongly disagreed*. Of the 29 participants, five voluntarily participated in a face-to-face or virtual interview consisting of five interview questions (Appendix B). Responses that were collected during the interview were analyzed and organized by classifying themes and patterns, and enhanced the survey data.

Demographics

This study was conducted during the 2022-23 school year within six elementary schools. The students in these elementary schools receive a personal device for academic use as part of their curriculum. The participants who consented to the online survey were given the option to skip any questions while completing it. Due to this method for collecting research, the number of responses varies for each question. The number of participants will be noted in each Table. Participant data will be reported in both numerical and percentage terms.

The demographic questions gathered information about the teacher's current grade level, the number of years teaching in this grade level, and the number of years the school district has offered students in that grade a personal device. Survey responses showed that teachers from across all grade levels, kindergarten to fifth, participated in the survey. Of these responses, four participants have taught in this grade level for less than five years, five have taught in their current grade level for 5-10 years, five participants have taught in their grade level for 11-15 years, two participants have been teaching this grade level for 15-20 years, and four participants have taught within their current grade level for more than 20 years. According to the data, 20 participants answered the demographic question that represented the number of years in which students had access to a personal device. Examples of personal devices were provided to the participants such as: portable iPad carts, a class set of laptops, or a 1-to-1 personal device. Four teachers mentioned their grade level had access to personal devices for 1-2 years, nine participants stated their students had a personal device for 3-4 years, two teachers had access to personal devices for their students for 5-6 years, and five participants indicated that their

students had access to a personal learning device for more than six years. The demographic data are presented in Tables 4.1, 4.2, and 4.3.

Table 4.1

Participant Grade-Level Teaching Assignment

Teaching Assignment	Responses
Kindergarten	9 (45%)
Grade 1	1 (5%)
Grade 2	1 (5%)
Grade 3	4 (20%)
Grade 4	1 (5%)
Grade 5	2 (10%)
No Response	2 (10%)

Note. N=20

Table 4.2

Number of Years Participant Has Been Teaching Current Grade Level

Number of Years	Responses
Less than 5 years	4 (20%)
5-10 years	5 (25%)
11-15 years	5 (25%)
16-20 years	2 (10%)
More than 20 years	4 (20%)

Note. N=20

Table 4.3

Number of Years Using One-to-One Devices

Number of Years	Responses
Less than 1 year	0
1-2 years	4 (20%)
3-4 years	9 (45%)
5-6 years	2 (10%)
More than 6 years	5 (25%)

Note. N=20

Compilation of Data

This study included 29 voluntary participants. Twenty participants completed the survey in its entirety. Of the participants, nine did not respond to one or more questions. The information is detailed as applicable to each research question. All multiple-choice and Likert-scale responses were collected through the online platform called SurveyMonkey. To maintain anonymity, no personal information was shared from the survey. Of the respondents, five volunteers participated in an interview with the researcher. Five prepared interview questions were asked by the researcher to enrich the data collected from the survey with respect to technology integration and professional development in the elementary literacy curriculum. Interviews were coded I1, I2, I3 I4, and I5 to preserve the confidentiality of participants and their responses. All data are labeled and reviewed in the “Interview Responses” sections in this chapter.

Research Question One

What are teachers’ perceptions when considering the value of technology integration in literacy instruction?

Research question one was intended to gather insight from current classroom teachers and their perceptions of the value technology has on their literacy instruction. The survey contained three multiple-choice questions and five Likert-scale statements related to the first research question. The survey questions were numbers 5, 6, 7, 10, 11, 12, 13, and 14. The five teachers who consented to an interview were asked one question that gathered the information for research question one.

There were four themes that emerged from the data. The first theme was teachers' use of technology to support their students' reading comprehension and phonics skills. This technology integration has been revealed to positively impact student achievement. The second theme to emerge was student engagement. Participants believe student engagement increases when technology is involved. The third theme discovered shows common assessments to demonstrate student achievement. Participants determine evidence of student learning when technology is used by teacher observation and formative assessments. The fourth theme to emerge was teachers' belief that technology integration supports their students as readers and writers in the 21st century.

Survey responses

There were three multiple-choice questions and five Likert-scale statements directly related to the first research question. The multiple-choice questions, five through seven, allowed participants to choose all responses that applied. Survey items 10 through 14 were Likert-scale statements that included "strongly disagree," "disagree," "agree," and "strongly agree." The participant responses are reported below.

Multiple-Choice. Question five, summarized in Table 4.4 had 20 participant responses. This question asked participants to reflect on skill areas where technology is used to support student achievement. Out of the 20 respondents to this question, 80% (n=16) perceive technology supports student achievement in reading comprehension. Fifty-five percent (n=11) of the participants utilize technology to support their students' word study, and 50% (n=10) of the participating elementary teachers integrate technology to support their students' phonemic awareness. Of the 20 participants who answered question five, 45% (n=9) utilize technology to support their students' phonics

achievements. Additionally, 35% (n=7) of respondents supplement instruction with technology to support reading fluency and 30% (n=6) of educators surveyed use technology to support vocabulary, planning, revising, editing, and writing composition. Of the 20 participants, 15% (n=3) utilize technology to support student writing achievement with sentence structure. Other responses were added to the comment section but do not reflect literacy instruction. These comments were not used in the data collection.

Data revealed that participating teachers most frequently integrate technology to support students' literacy achievement in the areas of comprehension, word study, and phonemic awareness. Writing instruction and students' writing composition are not as frequently supplemented with technology according to the teachers who participated in this survey. Data are summarized in the table below.

Table 4.4

Skill Areas Where Technology is Used to Support Student Achievement

Response	Number of Participants
Phonemic Awareness	10 (50%)
Word Study	11 (55%)
Phonics	9 (45%)
Comprehension	16 (80%)
Fluency	7 (35%)
Vocabulary	6 (30%)
Sentence Structure	3 (15%)
Planning, Revising, and Editing Writing	6 (30%)
Writing Composition	6 (30%)
None	0
Other: Content area-specific instruction (e.g., Social studies research, science videos)	1
Other: patterns, sentence, and action structure through coding blocks	1
Other: Listening to reading	1
N=20	

Question six used the same literacy skill areas mentioned above. This multiple-choice question differed as it asked teachers if they perceive technology to have a positive impact on student achievement in skill areas that support foundational reading and writing skills. This question allowed participants to select more than one area of the literacy curriculum in their response. For question six, 20 survey participants responded and 50% (n=10) perceive student comprehension to be positively impacted when technology is integrated into the school day. Of these same participants, 40% (n=8) also selected phonics as a skill area positively impacted by technology integration. Additionally, 35% (n=7) of respondents believe that students' phonemic awareness skills improve when technology is utilized during instruction. Of the 20 participants, 30% (n=6) selected vocabulary and 30% (n=6) selected planning, revising, editing, and writing composition as skill areas that are positively influenced by technology integration. Twenty-five percent (n=5) of participants selected word study and 15% (n=3) of volunteers selected student sentence structure as a skill area impacted by technology integration. A third-grade teacher added a response of "none" and did not contribute to the selections provided as a response. Additional comments were made by educators who observe technology positively impacting other subject areas in their curricular content. Since these comments do not reflect the literacy curriculum, they were not included in this data.

Overall, the data revealed that elementary educators perceive technology integration to be most impactful for their students' achievement in reading comprehension, phonics ability, and phonemic awareness skills. Fewer educators believe technology integration supports their students' vocabulary skills, writing composition,

and the steps of the writing process such as planning, revising, and editing. Table 4.5 displays data found from survey question six.

Table 4.5

Positive Impact on Student Achievement When Technology Was Used

Response	Number of Participants
Phonemic Awareness	7 (35%)
Word Study	5 (25%)
Phonics	8 (40%)
Comprehension	10 (50%)
Fluency	4 (20%)
Vocabulary	6 (30%)
Sentence Structure	3 (15%)
Planning, Revising, and Editing Writing	6 (30%)
Writing Composition	6 (30%)
None	1 (5%)
Other: Content area-specific instruction (e.g., Social studies research, science videos)	
Other: patterns, sentence, and action structure through coding blocks	
Other: Listening to reading	

N=20

Question seven, shown in Table 4.6, asked educators to identify assessment tools that provide evidence of student learning when technology is used. It is important to note that 18 participants answered the multiple-choice question by clicking the provided responses. Two participants did not select any predetermined responses. These two participants added separate comments as their responses. In all, question seven had a total of 20 participants. This multiple-choice question allowed participants to provide more than one response.

Data indicate that 90% (n=18) of participants who answered this question feel that teacher observation is the most frequently used assessment tool to show student

achievement after technology is used. Sixty percent (n=12) of the participating educators utilize formative assessments and 50% (n=10) use Fountas & Pinnell assessment to evaluate a student's academic reading progress after technology integration. When technology is used during literacy instruction, 45% (n=9) of participants believe that teacher-developed assessments provide insight into student understanding. Of the participants who integrate technology into their teaching practice, 30% (n=6) use summative assessments and 20% (n=4) utilize student portfolios to evaluate student understanding. When technology is integrated into literacy instruction, 5% (n=1) of participants perceive district-created rubrics to be useful to evaluate student learning. Of the volunteers, none of them use DIBELS as an evaluation tool. It is important to note that one participant, who identified as a third-grade teacher, did not choose any form of assessment as evidence of student learning when technology is used. This teacher added, "I cannot contribute technology to the gain in skills." Additionally, a first-grade teacher added a comment instead of selecting the assessment options provided. This participant responded "none" in the comment section.

The data showed that elementary educators who participated in this survey perceive observation, formative assessment, and Fountas and Pinnell assessments to be most beneficial in finding evidence of student learning when technology is used during instruction. Opposing data found that some participants do not utilize assessments to determine if technology integration supported students' literacy achievement.

Table 4.6

When Technology is Used, I See Evidence of Student Learning Through:

Response	Number of Participants
Observation	18 (90%)
Summative Assessments	6 (30%)
DIBELS Assessments	0
Teacher Developed Assessments	9 (45%)
Fountas & Pinnell Assessments	10 (50%)
District-Created Rubrics	1 (5%)
Student Portfolios	4 (20%)
Formative Assessments	12 (60%)
Other: "I cannot contribute technology to the gain in skills"	
Other: "not in any"	
Other: "peer assessment"	

N=20

Likert-scale responses. The purpose of survey questions 10 through 14 was to gather teachers' perceptions of the value of technology within literacy instruction. There were 20 participants who provided their opinion on each of these statements. The Likert-scale statements utilized a four-point choice option ranging from *strongly agree* to *strongly disagree*. Likert-Scale statements 10, 11, 12, 13, and 14 focused on teachers' perceptions of the value of technology to help students acquire foundational reading and writing skills. Additionally, these Likert statements gather teachers' perceptions about student engagement when technology is involved, and technology integration as it supports students reading and writing in the 21st century.

Data reveals that technology integration supports elementary students' foundational literacy skills and increases engagement. Statement number 10 asked respondents if incorporating technology into literacy instruction helps their students acquire foundational reading skills. Of the participants, 16 (80%) strongly agreed or agreed and four (20%) disagreed or strongly disagreed with the statement. Participants

were then encouraged to think about their instructional pedagogy when supporting students' writing skills in statement 11. Of the 20 respondents, 11 (55%) strongly agreed or agreed and nine (45%) disagreed or strongly disagreed that incorporating technology into literacy instruction helps their students acquire foundational writing skills. Additionally, survey statement 12 analyzed participants' perceptions of student engagement and responses disclosed that 19 (95%) strongly agreed or agreed, and one (5%) disagreed or strongly disagreed that student engagement increases when technology is integrated into their literacy instruction.

Additional data disclose that participants perceive technology integration supports their students' ability as readers and writers in the 21st century. Statement 13 encouraged participants to consider if technology integration in their classroom supports students' ability as readers in the 21st century. Research showed that 17 (85%) strongly agreed or agreed, and three (15%) disagreed or strongly disagreed that technology supports their readers in the 21st century. Similarly, statement 14 encouraged elementary educators to consider this statement with their students as writers in the 21st century. The responses to statement 14 revealed that 12 (60%) strongly agreed or agreed, and eight (40%) disagreed or strongly disagreed that technology integration in their classroom supports students' ability as writers in the 21st century. Data shows that teachers perceive technology to support student engagement with reading abilities more so than writing abilities. Results indicate that technology integration is perceived to support students' abilities as readers and writers in the 21st century.

Table 4.7 illustrates the individual Likert-scale statements and responses for research question one. Data displayed in Table 4.8 shows the results of Likert-scale

statements 10 through 14 by grade level. Results indicate that participants who teach grades three to five perceive technology integration supports their students' reading and writing for 21st century skills more so than participants who teach kindergarten to second grade.

Table 4.7

Teacher's Perceptions of the Value of Technology within Literacy Instruction

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
10. Incorporating technology into literacy instruction helps my students acquire foundational reading skills	0	16 (80%)	4 (20%)	0
11. Incorporating technology into literacy instruction helps my students acquire foundational writing skills	1 (5.00%)	10 (50%)	8 (40%)	1 (5%)
12. Student engagement increases when technology is integrated into my literacy instruction.	11 (55%)	8 (40%)	1 (5%)	0
13. Technology integration in my classroom supports students' ability as readers in the 21 st century.	8 (40%)	9 (45%)	3 (15%)	0
14. Technology integration in my classroom supports students' ability as writers in the 21 st century.	4 (20%)	8 (40%)	8 (40%)	0

N=20

Table 4.8

Teacher's Perceptions of the Value of Technology within Literacy Instruction by Grade Level

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Survey Question 10				
Grades K-1		7	3	
Grades 2-3		4	1	
Grades 4-5		3		
No Grade Specified		2		

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Survey Question 11				
Grades K-1		3	6	1
Grades 2-3		3	2	
Grades 4-5	1	2		
No Grade Specified		2		
Survey Question 12				
Grades K-1	6	3	1	
Grades 2-3	1	4		
Grades 4-5	3			
No Grade Specified	1	1		
Survey Question 13				
Grades K-1	3	6	2	
Grades 2-3		3	1	
Grades 4-5	3			
No Grade Specified	2			
Survey Question 14				
Grades K-1	1	3	6	
Grades 2-3		3	2	
Grades 4-5	2	1		
No Grade Specified	1	1		

N=20

Interview responses

Additional data was collected and analyzed through personal interviews. Five elementary educators were interviewed by the researcher. One interview question guided the discussion to gain insight into teachers' perceptions about the value of technology integration in literacy instruction. Teachers were given an opportunity to expand on their answers to provide the researcher with supplemental data about technology and literacy practices.

All five interview participants stated that their students benefit from technology integrated into their literacy instruction. The interviewees were able to share ways in which technology supports specific reading skills. Four out of the five participants shared that technology applications, offered on personal iPad or Chromebook, provide their students with a variety of reading levels, genres, and styles of books. Additionally, I4 uses technology to differentiate learning materials for a range of reading skills. Access to a wide range of books allows I4's students to participate in book clubs with peers of all ability levels. This participant stated that iPad applications provide students access to more challenging texts using the audio feature, rather than reading the text independently. This educator explained that this opportunity supports student engagement and the classroom community by allowing children of various reading levels to participate together. I4 also stated that students with a more advanced reading level can access books through reading applications that challenge their reading abilities. It is important to note, two of the five interview participants stated that technology integration supports students with reading and writing skills, "as long as it is intentional." This means that the reading and writing practice must support students' overall achievements and encourage personal growth. I1 stated that technology integration in literacy education is "not as successful as it is intended to be." The perspective is that technology has a wider potential, but students and teachers only have time to skim the surface of learning possibilities.

There was a positive relationship between three of the five interview participants related to technology integration for writing. Using technology during writing instruction was also mentioned by I1, I3, and I5. I1 believes technology supports students writing because it allows the children to focus on the content of their piece, not the spelling or

handwriting. I5, who agreed with this notion, added that students should use technology for the entire writing process. Although the children are given the option to use paper and pencil in I5's classroom, all students utilize OneNote on their iPad for writing, from drafting to publishing their writing. This educator explained that utilizing OneNote for writing provides access to the student's writing in real-time which supports teachers with immediate feedback. Teacher I5 believes that access to this specific technology feature supports students' overall writing in the classroom. This positive relationship reveals that participants perceive technology integration as supportive of their students' writing composition.

All five interview participants feel that integrating technology into their classroom increases their students' motivation to practice literacy skills, however, I3 stated that technology has its pitfalls. This individual was asked to expand on this response and stated that technology is positive as long as teachers have the ability and time to work through problems and prepare meaningful lessons with it.

Research question one targeted teachers' perceptions about the value of technology as it is integrated into their literacy instruction. Together, the survey and interview data show that teachers are utilizing technology to support their students' foundational reading and writing skills. Data reveals that educators believe student achievements are on the rise in areas of reading comprehension, phonics, and phonemic awareness. When technology is used during literacy instruction, current educators see evidence of student learning through observations and formative assessments. Participants shared that their students are more motivated when technology is used for instruction and when teachers can utilize technology to provide immediate feedback.

Overall, the data from research question one reveal four themes. The first theme was the use of technology to support their students' reading comprehension and phonics skills. The second theme of student engagement displays that it was positively impacted by technology integration. The third theme that arose from the data was about assessments used to determine student achievement. Participants utilize observation and formative assessments most frequently to determine students' literacy progress. The fourth theme to emerge was the belief that technology integration supports students as readers and writers in the 21st century.

Research Question Two

What are teachers' perceptions of their own technological pedagogical content knowledge (TPACK) during literacy instruction?

Research question two was addressed using 11 Likert-scale statements from the survey and two interview questions. The survey statements and interview questions encouraged educators to share their perceptions about their own technological pedagogical content knowledge and how it supports their instructional practices.

Survey responses

Of the 29 educators who consented to participate in this research study, 20 provided their opinion for Likert-scale statements 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25. These statements were directly related to research question two and included a 4-point Likert-scale response of "strongly disagree," "disagree," "agree," and "strongly agree." The participant responses have been grouped by themes that emerged from the data. There were four themes related to the second research question. The themes that

emerged were content knowledge (statements 15, 19, 21), technology knowledge (statements 17, 23), technological content knowledge (statements 18, 20, 22, 24, 25), and time (statement 16).

The first theme that emerged from data was content knowledge. This theme addresses participants' overall ability and confidence when teaching students the language arts curriculum without the use of technology. Statement number 15 asked teachers if they feel as though they have sufficient knowledge about the language arts curriculum at their current grade level. Of the 20 responses, 19 (95%) strongly agreed or agreed, and one (5%) disagreed or strongly disagreed. Survey statement 19 asked educators if they are confident in their ability to differentiate instruction for a variety of academic levels within reading instruction, without the use of technology. Of participant responses, nine (45%) strongly agreed, nine (45%) agreed, and two (10%) disagreed or strongly disagreed with the statement. Similarly, teacher participants were provided statement 21 asking if they feel confident in their ability to differentiate instruction for a variety of academic levels within their writing instruction, without the use of technology. There were 11 (55%) participants who stated they strongly agreed, six (30%) agreed, and three (15%) disagreed or strongly disagreed. Overall, participants showed confidence in their literacy content knowledge and in providing individualized instruction without technology.

The second theme that emerged was technology knowledge. This theme addresses participants' general confidence in learning technology features. In survey statement 17, teachers were encouraged to consider their level of confidence in their ability to learn new technology that will support their literacy instruction and 19 (95%) strongly agreed,

or agreed, and one (5%) disagreed or strongly disagreed that they can learn new technology to support literacy instruction. Of these responses, there was a comparable distribution across the participants' number of years teaching. This data indicates that the age of the participant does not determine the willingness or ability to learn new technology. Statement 23 asked participants if they are confident about the technologies they choose to enhance student learning during whole-group literacy instruction. Of the 20 responses, 18 (90%) strongly agreed or agreed, and two (10%) disagreed or strongly disagreed. This data reveal participants' willingness to learn new instructional technology, no matter how experienced the participant.

The third theme that emerged was participants' technological content knowledge. This refers to a teacher's understanding of how to apply technology to enhance literacy content. Survey statement 18 asked participants if they believe their teaching pedagogy is supported when technology is integrated into their instruction. Of these participants, three (15%) strongly agreed, 12 (60%) agreed, and five (25%) disagreed or strongly disagreed that their teaching is supported when technology is involved. Following this, survey statement 20 asked educators to consider if they are confident in their ability to differentiate instruction for a variety of academic levels within reading instruction, with the use of technology. This statement had two (10%) participants who strongly agreed, 12 (60%) agreed, and six (30%) disagreed or strongly disagreed. In the same form, statement 22 asked if participants feel confident in their ability to differentiate instruction for a variety of academic levels within their writing instruction, with the use of technology. One (5%) strongly agreed, 11 (55%) agreed, and eight (40%) disagreed or strongly disagreed. Overall, participants feel confident in their ability to apply technology to their

literacy instruction. Upon further analysis of statements 20 and 22, research showed that the years of teaching experience did not impact participants' confidence in differentiating reading or writing instruction with the use of technology.

Participants reveal that they feel less confident when using technology for individualized remediation on a one-to-one device as compared to utilizing technology for whole-class literacy instruction. Statement 24 provided insight into the theme of technological content knowledge. In response to this statement, ten (50%) strongly agreed or agreed, and ten (50%) disagreed or strongly disagreed that they know how to provide students with individualized remediation using a one-to-one device. Additional data show that the years of service did not influence how participants responded to statement 24. Also, statement 25 asked participants if they feel confident when teaching lessons that appropriately combine literacy, technologies, and their personal teaching pedagogy. Of the participants, 15 (75%) strongly agreed or agreed that they feel confident when combining literacy and technology. Conversely, five (25%) disagreed or strongly disagreed with the statement. Overall, participants feel confident in providing students with literacy instruction that utilized technology features, however, only half of the participants feel confident in providing students with remediation in the form of a one-to-one learning device.

The fourth theme that emerged was time. Statement 16 refers to the time within the school day. Participants were asked if they felt that they have enough time during the school day to incorporate technology into the literacy curriculum that they teach. This literacy instruction refers to time used to teach the whole class and time used to teach students individually. Out of the 20 participants, seven (35%) strongly agreed or agreed

that they have enough time to incorporate technology. Of these responses, 13 (65%) disagreed or strongly disagreed that they have enough time to incorporate technology into the literacy curriculum. More data related to teachers' perceptions of time, or lack thereof, are reported in the interview section for research question two.

Overall, survey data for research question two reveal that participants are confident in their content knowledge, technology knowledge, and implementing technology into their whole-group literacy instruction. Participants feel less confident in providing individualized enrichment or remediation with students' personal devices. Participants need more time to explore this barrier. Table 4.9 illustrates the individual Likert-scale statements and responses associated with the second research question. Table 4.10 categorizes these responses by years of service in the current grade level.

Table 4.9

Teacher's Perceptions of Their Own Technological Pedagogical Content Knowledge during Literacy Instruction

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
15. I have sufficient knowledge about the language arts curriculum at the grade level I teach.	10 (50%)	9 (45%)	1 (5%)	0
16. I have enough time during the school day to incorporate technology into the literacy curriculum that I teach.	0	7 (35%)	10 (50%)	3 (15%)
17. I am confident in my ability to learn new technology that will support my literacy instruction.	8 (40%)	11 (55%)	1 (5%)	0

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
18. I believe my teaching pedagogy is supported when I integrate technology into my instruction.	3 (15%)	12 (60%)	5 (25%)	0
19. I am confident in my ability to differentiate instruction for a variety of academic levels within my reading instruction, without the use of technology.	9 (45%)	9 (45%)	1 (5%)	1 (5%)
20. I am confident in my ability to differentiate instruction for a variety of academic levels within my reading instruction, with the use of technology.	2 (10%)	12 (60%)	6 (30%)	0
21. I am confident in my ability to differentiate instruction for a variety of academic levels within my writing instruction, without the use of technology.	11 (55%)	6 (30%)	3 (15%)	0
22. I am confident in my ability to differentiate instruction for a variety of academic levels within my writing instruction, with the use of technology.	1 (5%)	11 (55%)	8 (40%)	0
23. I am confident about the technologies I choose to enhance student learning during whole-group literacy instruction.	4 (20%)	14 (70%)	2 (10%)	0
24. I know how to provide students with individualized remediation using a one-to-one device.	3 (15%)	7 (35%)	9 (45%)	1 (5%)

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
25. I feel confident when teaching lessons that appropriately combine literacy, technologies, and my personal teaching pedagogy.	2 (10%)	13 (65%)	5 (25%)	0

N=20

Table 4.10

Teacher's Perceptions of Their Own Technological Pedagogical Content Knowledge during Literacy Instruction by Years of Service in Current Grade Level

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Survey Question 15				
Less than 5 years	1	2	1	
5-10 years	1	4		
11-15 years	4	1		
16-20 years	2			
More than 20 years	2	2		
Survey Question 16				
Less than 5 years		1	2	1
5-10 years		2	3	
11-15 years		2	3	
16-20 years			1	1
More than 20 years		2	1	1
Survey Question 17				
Less than 5 years	2	1		1
5-10 years		5		
11-15 years	1	4		
16-20 years	2			
More than 20 years	2	1	1	
Survey Question 18				
Less than 5 years	1	3	2	
5-10 years		2	1	
11-15 years		4		
16-20 years	1	1		
More than 20 years	1	2	1	

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Survey Question 19				
Less than 5 years	2	2		
5-10 years	2	2		1
11-15 years	3	1	1	
16-20 years	2			
More than 20 years		4		
Survey Question 20				
Less than 5 years	1	2	1	
5-10 years		3	2	
11-15 years		3	2	
16-20 years	1	1		
More than 20 years		3	1	
Survey Question 21				
Less than 5 years	2	2		
5-10 years	3		2	
11-15 years	3	2		
16-20 years	2			
More than 20 years	1	2	1	
Survey Question 22				
Less than 5 years	1	1	2	
5-10 years		3	2	
11-15 years		4	1	
16-20 years		1	1	
More than 20 years		2	2	
Survey Question 23				
Less than 5 years	1	3		
5-10 years		3	2	
11-15 years	1	4		
16-20 years	1	1		
More than 20 years	1	3		
Survey Question 24				
Less than 5 years	1	1	1	1
5-10 years	1	1	3	
11-15 years	1	2	2	
16-20 years		1	1	
More than 20 years		2	2	

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Survey Question 25				
Less than 5 years	1	2	1	
5-10 years		2	2	
11-15 years		4	1	
16-20 years		2		
More than 20 years	1	2	1	

N=20

Interview responses

Five volunteers agreed to supplement their survey data with a personal interview. Two questions from the interview sought to find teachers' perceptions about their own technological pedagogical content knowledge during literacy instruction. The first interview question asked participants if they are using technology during literacy instruction, and if so, how? The second interview question asked participants if there are personal or professional barriers to implementing technology into their literacy instruction.

A common theme emerged from the first and second interview questions. This theme was technological pedagogical content knowledge. Of the five interview participants, all stated that they feel comfortable using technology offered by their school district. When asked if they are utilizing technology for literacy instruction, all five mentioned that they are utilizing technology regularly during whole-group literacy instruction. It is noted that all educators have the option to use a Smart Board, Clear Touch, and/or ELMO projector in their classroom. Although each participant said they use technology resources provided by their district, all five participants stated that they must supplement their literacy curriculum with online tools such as Teacher's College

resource videos, YouTube, and BrainPOP, however, these resources are not an official part of the provided curriculum.

In response to interview question one, each of the interview participants specified that they assign students with independent work on their personal learning devices. Participants from both school districts interviewed provide students access to reading apps like EPIC and Sora. Interview participants I2 and I3 use EPIC as a free-choice station for reading. During this literacy block, children may choose books to read or to listen to. Additionally, I2, I4, and I5 provide students with themed book collections within reading applications that relate to other subject areas or current holidays. These educators believe that this option offers students additional reading resources; increasing motivation and engagement. In addition to reading from EPIC or Sora, I2, I3, and I5 utilize 1:1 personal devices for individualized student literacy practice on an app called Seesaw. These interview participants stated that they assign teacher-developed assignments that focus on individualized practice with phonics, word study, understanding of story elements, and fluency practice on students' personal devices using this app.

The second theme, time, arose from interview question two. Interview question two focused on personal and professional barriers that discourage educators from utilizing technology for literacy instruction. During the interview, the researcher provided examples of personal and professional barriers to support each interview. Although examples of personal barriers were mentioned, such as "limited knowledge of technology" and "lessons already effective" no participant stated a personal barrier as problematic.

During the interviews, the researcher provided examples of professional barriers such as “inadequate access to technology” and “lack of time.” Four out of the five participants stated that time is a professional barrier to purposeful technology integration. I1 mentioned time as being the most challenging barrier. This individual feels confident in the ability to use technology during literacy instruction, but does not have the time to “engage in various technology ideas that may support my literacy curriculum.” The curriculum content for this school district is online and provides 90 minutes of instruction daily, minimizing the time for student research, project-based learning, and exploration. I1 also stated that in the past five years, professional development has not been offered to explore the new literacy curriculum or existing technology features, even the new online literacy program. I2, I3, and I5 mentioned frustrations with the time needed to explore applications and technology devices in depth. I2 stated that “time provided by the district to explore our technology tools” would expand teacher knowledge about the use of students’ 1:1 devices. This participant, along with I3 would like to utilize personal iPads more frequently and more effectively with their students. I5 asserted that time to work with more knowledgeable colleagues would be beneficial and would support professional growth for individualized use of the Teams and OneNote.

A professional barrier mentioned by all five interview participants was technology features that do not work when they are needed. For example, three interview participants mentioned iPad application updates or installations without warning. This process delays teacher and student access to the device or application. I3 stated that app updates force students to do something that was not intentionally planned and typically does not support students’ academic needs. Similarly, I5 mentioned another professional barrier to

technology integration that interferes with the productivity of the school day. This participant revealed that applications must be approved by administrative staff before they can be uploaded for student use. This causes a delay in students' academic access.

Furthermore, I2 shared a concern about the content of self-selected texts online as a professional barrier. This teacher becomes concerned with the self-selected text due to the range of content topics, text levels, and genres students have access to choose to read. At times reading content may be inappropriate for the student's grade level and/or the morals of individual families. Maintaining this independent book selection is challenging for this particular teacher.

It is important to note, I5 provided insight that is believed to reduce the lack of time as a professional barrier. This participant stated that students begin their school year as "fluent" technology users. This classroom teacher feels that incoming students learn a lot from the previous grade level, reducing the need for pre-teaching specific technology skills. This prior knowledge supports each student's ability to use applications for taking notes, utilizing graphic organizers, and completing the writing process; minimizing time as a technology barrier.

Two interview questions were used to support the second research question which focused on teachers' perceptions of their technical knowledge and how they combine this with their literacy instruction, resulting in their technological pedagogical content knowledge. The two interview questions revealed two themes. The themes were perceptions of technological pedagogical content knowledge and time. Currently, all interview participants utilize technology to support student achievements in language arts. According to the five interview participants, they feel confident in their ability to

learn and use technology in their classrooms, but not as confident in merging this technology into personalized literacy activities. Although there were no personal barriers mentioned, professional barriers related to time for teacher exploration, the lack of professional development opportunities to explore current student applications on 1:1 devices, and the time needed for application updates are a hindrance to efficient time on task.

Overall, the themes that emerged from the survey and interview data related to the second research question reveal four themes. The first two themes were content knowledge and technology knowledge. Data found that participants are confident in their ability to provide individualized instruction in reading and writing within their classrooms, without the use of technology. These participants also feel confident in learning new technology features that will support their overall technological content knowledge for integrating technology into literacy instruction. The third theme was teachers' perceptions of their technological pedagogical content knowledge. Participants from the research study feel comfortable integrating technology into whole group instruction, but are not as confident with their abilities to assign individualized remediation or enrichment with personalized learning devices. Nevertheless, time or lack thereof has been identified as the fourth theme and the most challenging barrier to overcome. Participants would like more time to explore existing applications to support more frequent individualized instruction, more time to work with knowledgeable colleagues who could support technology integration more efficiently, and time to support students in choosing appropriate books for their age, personal interests, and reading levels.

Research Question Three

What are teachers' perceptions of the role of professional development in the implementation of technology in elementary literacy classrooms?

The purpose of research question three was to identify teachers' perceptions about the role of professional development to support elementary educators as they implement technology into their literacy instruction. There were 20 participants who provided their opinion on the survey and five who participated in the interview about the role of professional development in the implementation of technology during literacy instruction.

Two themes emerged from the data collected for research question three. The themes were common professional development training and the role of professional development. The first theme, common professional development training, was analyzed within the past five years. The most common forms of training offered by consenting school districts are online sessions and in-person training. Overall, in-person training has been found to be the most impactful among survey participants. The second theme that emerged was the role of professional development for technology integration and suggestions to support individual teachers' needs.

Survey responses

Data were collected for the third research question in the form of a survey, that consisted of two multiple-choice questions and eight Likert-scale statements, and two interview questions. The multiple-choice questions, eight and nine, allowed participants to choose all responses that applied. Survey items 26 through 33 were Likert-scale

statements that included “strongly disagree,” “disagree,” “agree,” and “strongly agree.” The participant responses are reported below.

Multiple-Choice Questions. Multiple-choice question eight focused on the types of district-based professional development opportunities that teachers have experienced within the last five years. This question allowed participants to choose all that apply to their professional training. Of these 20 responses, 100% (n=20) of participants have completed online sessions to support their professional growth related to technology integration. Additionally, 80% (n=16) of the volunteers have spent time involved with in-person training. Of the participants, 50% (n=10) indicate that they were offered professional development in the form of videos sent by their school district. Forty-five percent (n=9) of survey participants have experienced single-session seminars for professional development. Also, 40% (n=8) of participants have been provided with in-classroom observations to support their technology integration. Of the remaining selections, 35% (n=7) of the volunteers underwent periodic workshops for the purpose of professional growth. Furthermore, 30% (n=6) of the participants have experienced peer mentoring and time for reflection within the past five years. The method of professional development seen by the fewest number of survey participants was 1 on 1 coaching with 15% (n=3) of participant responses.

Overall, in the past five years, participants have received online sessions and in-person training most often. The next most frequently offered method of professional training offered to participants were videos and single-session seminars. Data revealed that less than 50% of volunteers have participated in the following methods of professional development: in-class observation, time for reflection, peer mentoring, and

1-on-1 coaching. Table 4.11 represents participants' responses to the multiple-choice question.

Table 4.11

In the Last 5 Years, Type of Professional Development Experienced

Response	Number of Participants
In-person training	16 (80%)
Online sessions	20 (100%)
Videos Sent by my school district	10 (50%)
1-on-1 coaching	3 (15%)
Peer mentoring	6 (30%)
Periodic workshops	7 (35%)
Single-Session Seminars	9 (45%)
Time for reflection	6 (30%)
In-classroom observation	8 (40%)
None	0

N=20

Provided the same multiple-choice selections in question nine, teachers were asked to reflect on the professional development experiences provided by their school district in the past five years and determine which sessions have positively impacted their teaching practices. Of the 20 participants, 90% (n=18) perceive that in-person training was the most successful in supporting their literacy instruction. Forty-five percent (n=9) of participants believe that online sessions positively supported their professional development. Of the teachers surveyed, 25% (n=5) felt periodic workshops were beneficial to their teaching practices when considering technology integration.

Additionally, out of the 20 participating teachers, 20% (n=4) perceive the following forms of professional development as supportive of their technology integration: in-classroom observation, time for reflection, and peer mentoring. Of the consenting participants, 15% (n=3) viewed 1 on 1 coaching single-session seminars as impactful to their teaching practices. Finally, 10% (n=2) of responses indicate that videos sent by the

school were beneficial among all participants. It is important to note that one participant added a response within the “other” option. This educator believes collaboration with colleagues has positively impacted his/her teaching practices.

Data showed that participants perceive in-person training as most impactful to their teaching practices, which 80% of participants had received in the past five years. Additionally, online sessions were provided to 100% of participants, but only 45% of the participants felt the online sessions were impactful. For each of the remaining forms of professional training listed in this multiple-choice question, less than half of the elementary educator participants selected periodic workshops, peer mentoring, time for reflection, in-classroom observation, 1-on-1 coaching, and videos sent by the school district to have a positive impact on teaching practices. Table 4.12 summarizes participants’ responses related to types of professional development that have impacted teaching practices.

Table 4.12

Type of Professional Development that Positively Impacted Teaching Practices

Response	Number of Participants
In-person training	18 (90%)
Online sessions	9 (45%)
Videos Sent by my school district	2 (10%)
1-on-1 coaching	3 (15%)
Peer mentoring	4 (20%)
Periodic workshops	5 (25%)
Single-Session Seminars	3 (15%)
Time for reflection	4 (20%)
In-classroom observation	4 (20%)
None	0
Other: Collaboration with Colleagues	1

N=20

Likert-scale statements. Survey items 26 through 33 were Likert-scale statements that supported the third research question. The purpose was to gather current teachers' perceptions about the role of professional development for technology integration in their literacy instruction. There were 20 participants who provided their opinion on each of these statements. The Likert-scale statements utilized a four-point choice option of *strongly agree, agree, disagree, and strongly disagree*.

Participants were encouraged to think about the benefits of a mentor teacher, or their own ability to be a peer mentor in the following statements. Statement 26 encouraged participants to consider if a mentor teacher who is given adequate time to teach them how to combine the language arts curriculum and technologies would be of great use. Of the 20 responses, 19 (95%) strongly agreed or agreed and one (5%) participant disagreed with this statement about the use of a mentor. Additionally, statement 27 asked if teachers felt confident in their ability to serve as a mentor and teach other educators how to utilize a one-to-one device to support students' literacy skills. There was a strong level of agreement with this statement. Of the participants, 14 (60%) disagreed or strongly disagreed that they could serve as a mentor teacher. For this statement, the years of service did not influence the participants' opinions about their ability to act as a technology mentor.

Participant responses for statements 28 and 29 demonstrated a strong level of agreement for each survey question. These questions focused on the overall experiences during professional development related to training about utilizing a student's one-to-one personal device. Statement 28 gathered data about district-based professional development sessions that taught elementary educators how to combine their language

arts curriculum with one-to-one device applications to provide students with writing practice. Data revealed that 19 (95%) of the participants disagreed or strongly disagreed that in the past five years they have received professional development opportunities that enhanced their technological pedagogical content knowledge. Similarly, statement 29 asked participants if district-based professional development sessions have taught them how to combine the language arts curriculum with one-to-one device applications to provide students with reading practice. In responding to this statement, 18 (90%) disagreed or strongly disagreed that professional development sessions have provided them with suggestions for using personal devices to support students' reading skills.

The next survey questions encouraged participants to think about district-based professional development opportunities they have received in the past five years. In statement 30, participants were asked if these professional development opportunities have caused them to think about how technology can positively influence students' literacy achievements. Of the participants, seven (35%) strongly agreed or agreed, 10 (50%) disagreed, and three (15%) strongly disagreed with that statement. In addition, statement 31 asked participants to give their perspective on district-based professional development they have been offered in the past five years and whether it provided enough time to explore and prepare instruction with different technologies. There was a strong level of agreement with this statement as 17 (85%) of the 20 respondents disagreed or strongly disagreed that they are offered an adequate amount of time to explore and prepare their literacy instruction. The years of service did not impact the response rate to this survey question.

Survey statements 32 and 33 focused on time to reflect during professional development. There was a strong level of agreement in both statements. Statement 32 encouraged participants to consider if they have been offered time to reflect during district-based professional development about how to use technology for reading instruction. Sixteen of the 20 responses (80%) disagreed or strongly disagreed with this statement. Additionally, statement 33 asked participants if they have time to reflect during district-based professional development about how to use technology for writing instruction. Of the responses, 19 (95%) disagreed or strongly disagreed that they are provided with enough time to reflect during professional training sessions about ways to consider using technology in their writing lessons.

Data from the multiple-choice questions and statements 26 through 33 display teachers' perceptions about the role of professional development. Elementary educators who participated in this survey felt strongly about the positive impact a mentor teacher would have on their literacy instruction with the use of technology. However, when asked if they would feel confident supporting colleagues as a mentor, most of the participants disagreed. Additional findings show that participants of this study have not received professional development opportunities that demonstrate how to incorporate one-to-one student devices more effectively to support individualized reading and writing instruction. Also, data reveal that participants would gain professional growth from more time to reflect on ways to do so. Overall, participants from this study would benefit from more in-person professional development opportunities that provide individualized guidance from a mentor. Additionally, participants would like to experience more time to prepare individualized lessons, plan for ways to incorporate technology into literacy

instruction and reflect on past lessons that effectively incorporated technology into a whole class setting. Table 4.13 summarizes this data. Table 4.14 categorizes these responses by years in the current grade level.

Table 4.13

Teacher's Perceptions of the Role of Professional Development for the Implementation of Technology in Literacy Classrooms

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
26. A mentor teacher who is given adequate time to teach me how to combine the language arts curriculum and technologies would be of great use to me.	14 (70%)	5 (25%)	1 (5%)	0
27. I am confident in my ability to serve as a mentor to teach other educators how to utilize a one-to-one device to support students' literacy skills.	2 (10%)	4 (20%)	10 (50%)	4 (20%)
28. District-based professional development sessions have taught me how to combine the language arts curriculum and one-to-one device applications to provide my students with writing practice.	0	1 (5%)	14 (70%)	5 (25%)
29. District-based professional development sessions have taught me how to combine the language arts curriculum and one-to-one device applications to provide my students with reading practice.	0	2 (10%)	13 (65%)	5 (25%)

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
30. District-based professional development opportunities have caused me to think about how technology can positively influence students' literacy achievement-	0	7 (35%)	10 (50%)	3 (15%)
31. District-based professional development gives me time to explore and prepare my instruction with different technologies.	0	3 (15%)	12 (60%)	5 (25%)
32. I have time to reflect during district-based professional development about how to use technology for reading instruction.	0	1 (5%)	15 (75%)	4 (20%)

N=20

Table 4.14

Teacher's Perceptions of the Role of Professional Development for the Implementation of Technology in Literacy Classrooms by Years in Current Grade Level

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Survey Question 26				
Less than 5 years	2	1	1	
5-10 years	4	1		
11-15 years	5			
16-20 years	2			
More than 20 years	1	3		
Survey Question 27				
Less than 5 years	1		2	1
5-10 years		2	2	1
11-15 years			4	1
16-20 years	1			1
More than 20 years		2	2	

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Survey Question 28				
Less than 5 years			3	1
5-10 years			3	2
11-15 years		1	4	
16-20 years			2	
More than 20 years			2	2
Survey Question 29				
Less than 5 years			2	2
5-10 years		1	3	1
11-15 years			4	1
16-20 years			2	
More than 20 years			2	2
Survey Question 30				
Less than 5 years		1	2	1
5-10 years		3	2	
11-15 years		2	2	1
16-20 years			2	
More than 20 years		1	2	1
Survey Question 31				
Less than 5 years		1	1	2
5-10 years			4	1
11-15 years		2	3	
16-20 years			1	1
More than 20 years			3	1
Survey Question 32				
Less than 5 years		1	1	2
5-10 years		1	4	
11-15 years		2	3	
16-20 years			1	1
More than 20 years			3	1
Survey Question 33				
Less than 5 years			2	2
5-10 years			5	
11-15 years		1	4	
16-20 years			1	1
More than 20 years			3	1

N=20

Interview responses

Two interview questions sought to gain greater insight from participants related to the third research question. The third research question encouraged participants to provide their perceptions about the role of professional development in the implementation of technology in elementary classrooms. Interview question four asked participants if their school district offers professional development opportunities related to technology integration for literacy instruction. Interview question five asked what participants would like to see offered in terms of professional development opportunities to support technology integration.

In response to interview question four, all five participants said their school district does not offer professional development opportunities related to technology integration for literacy instruction. I1 proceeded to speak about a new technology-based literacy program being used in School District One. This participant, along with district colleagues, have not received more than one hour of professional training for this new literacy program. This participant said that no time has been offered to explore technology features or ways to expand the content within this program for a range of student abilities.

Participant I3 replied to interview question four by stating that School District Two does not offer specific professional development opportunities related to technology integration for literacy instruction. I3 did mention that teachers have been sent brief overviews about content-based learning applications on student iPads, but would not consider it as professional development. Additionally, during personal interviews, I4 and I5 noted that new applications were being uploaded to the students' 1:1 devices and the

only information provided to teachers was their students' login information. No additional material, time, or professional development sessions were provided to the classroom teachers to prepare for use in these applications. Both participants expressed frustration with this. All five interview participants stated that they would prefer more opportunities for purposeful technology professional development.

While elaborating on interview question four, interview participants I2, I3, and I5 stated they benefit from grade-level colleagues who share suggestions about technology strategies that support literacy instruction. I2, I3, and I5 have access to knowledgeable colleagues who share successful methods of technology integration that they have found support student achievement. I2, I3, and I5 stated that this information is typically shared during personal work time. All three interview participants confirmed that working with a more knowledgeable colleague acts as an effective alternative to professional training for purposeful technology integration. Also, each interview participant stated that regular practice with technology has transferred to their teaching pedagogy and they feel confident while using it in their classroom.

Interview question five asked each participant what they would like to see offered to elementary educators in terms of professional development and technology integration for literacy instruction. All five of the interview participants believe that structured time to explore technology features, which will support planning individualized learning experiences for students, would be most beneficial for literacy instruction. Participant I3 offered suggestions to administrative staff to plan informative sessions related to one or two apps that go in-depth about its educational features. An in-depth analysis of each application will provide a thorough overview of supplemental tools for literacy skill

practice. I3 acknowledged that a mentor teacher or technology coach would be useful to support this notion. A mentor teacher or technology coach, who can identify specific skills to focus on within the appropriate grade levels, would support building teachers' technological pedagogical content knowledge for literacy. Similarly, I2 and I5 also stated that a coaching mentor would be beneficial. I2 mentioned a district employee who can "push us in the right direction" and show teachers important learning features of literacy applications would be very beneficial. Additionally, I5 would like a coaching mentor to share ideas about differentiating student materials using technology features provided by the district.

With varied responses, more questions were asked about professional learning communities to support technological pedagogical content knowledge. I5 stated that due to opposing positions of grade-level colleagues, this option would not be beneficial. An individual mentor would be more valued for I5. Interview participants I1, I2, I3, and I4 support the idea of a small professional learning community to target professional development for technology integration. It is important to note that both school districts have a working technology mentor. The participants who consented to the interview were unaware of this.

In response to interview question five, which asked participants to provide suggestions for impactful professional development opportunities, I3's response noted the importance of addressing the range of ability levels in terms of teachers' technology knowledge. This interview participant suggested that elementary educators be offered differentiated training experiences based on the same technology device or application. In order to support this suggestion, I3 shared an idea for professional development where

elementary teachers scan a QR code to receive in-depth application features based on technology skill levels and literacy content areas. Each QR code must be tailored to meet a variety of technical skill levels and a range of literacy skills. This educator felt strongly about teachers receiving an opportunity to choose applications that are suitable for their core content areas and ability levels.

Furthermore, participants stressed that applications on students' iPads or Chromebooks must meet academic and developmental needs. For more purposeful professional development, I5 would like to see professional development resources that "pinpoint skills" like reading accuracy or fluency. This teacher has access to applications that offer text options for reading and listening but does not know how to formatively assess children when they are using this technology. In addition to I5's suggestion, I1 stated that technology options on personal devices should "expand on knowledge" that students already have to enhance their understanding and exposure to literacy content. I1 would like to provide enrichment in project-based learning opportunities, instead of using a rote teaching model. In order to accomplish this, all five interview participants would benefit from more time devoted to teacher planning and execution of learning objectives to expand course content.

Overall, two themes emerged from the data collected for the third research question. The first theme that emerged from the survey and interview data was professional development experiences. Participants perceive in-person training as the most impactful form of development and would prefer more differentiated varieties to support their technology knowledge. The second theme that emerged was the role of professional development to support teachers' technological pedagogical content

knowledge. Professional development must demonstrate how to integrate available technology with the curriculum by providing teachers with individualized methods of training, such as peer models and time to explore technology devices. Participants agreed that training should incorporate student technology devices and the literacy curriculum for more specific and individualized instruction benefits.

Summary

The purpose of this study was to consider elementary educators' perceptions about technology integration for literacy instruction in grades K-5 and the role of professional development in this implementation process. Twenty-nine participants consented to the online survey but an average of 20 participants provided their viewpoint to the four demographic questions, five multiple-choice questions, and 24 Likert-scale statements. A total of five participants volunteered for a personal interview to enhance survey data. The survey and interview data were combined to reveal common perceptions of educators about technology use within literacy instruction, perceptions about their own technological pedagogical content knowledge, and the role professional development has in supporting technology integration.

Many themes emerged from this data. These themes included the value of technology for reading and phonics achievement, student engagement, assessing student achievement, the value of technology for 21st-century reading and writing skills, content and technology knowledge, technological content knowledge, time, methods of professional training, and technological pedagogical content knowledge. In summary, the research revealed that technology integration is valued by the participants, regardless of their years of service. When technology is integrated during instruction, participants

see an increase in students' reading comprehension and phonics abilities through observations and formative assessments. Furthermore, data revealed that participants feel confident in their content knowledge and technology knowledge, however, participants made it clear that they do not receive impactful professional training to support the growth of their technological pedagogical content knowledge related to individualized literacy instruction. Also, the most impactful professional development sessions are in-person training, however, participants would prefer more provided by the school district. Participants stressed that they require more specialized professional development opportunities that pinpoint teaching strategies related to differentiating literacy content. Additionally, data show that participants require scheduled and structured professional development time devoted to exploring literacy apps and time to work with knowledgeable technology mentors. The data presented in Chapter Four answered the three research questions that guided this study. The findings and implications are described in Chapter Five.

Chapter Five – Discussion

Summary of the Study

The purpose of this qualitative study was to uncover current elementary educators' perceptions about technology integration for literacy instruction, and the role of professional development to support it. With the increased demand for technology used for communication and collaboration within the workforce, it is important that students have an opportunity to experience and use technology to its fullest potential. Additionally, students must build on their own digital literacy skills as one-to-one device initiatives are becoming paramount for functionality in the 21st century. As educational instruction takes a more technological shift, the perspective of elementary teachers provides a unique component to understanding successes and challenges as they provide students with the skills to launch these digital skills.

This research study was directly related to three research questions. Research question one analyzed elementary teachers' perceptions when considering the value of technology integration in literacy instruction. Elementary educators' perceptions about their own technological pedagogical content knowledge during literacy instruction guided research question two. Research question three examined elementary educators' perceptions about the role of professional development in the implementation of technology in their literacy classrooms.

Data were obtained from participants who teach elementary language arts within kindergarten through grade five. These educators were sent a researcher-designed online survey which included four demographic questions, five multiple-choice questions, and

24 Likert-scale statements via email. To begin the survey, volunteers were asked to consent to participate, with the understanding that they had the choice to skip any question or stop the survey at any point in time. Twenty-nine volunteers consented to participate in the survey with 20 participants regularly answering each question. At the conclusion of the online survey, participants had the option to volunteer for a follow-up interview to enhance the data about technology integration within literacy instruction. Five people volunteered for the interview, which consisted of five predetermined questions. Survey and interview data were coded, analyzed, and organized according to themes that arose based on the three research questions.

Summary of the Results

The purpose of this qualitative research study was to understand teachers' perceptions of the value of technology integration into their literacy instruction, perceptions of their own technological pedagogical content knowledge, and to determine the role of professional development in the implementation of technology in elementary literacy classrooms. Three research questions framed the research and data were collected and analyzed. Common themes related to the three research questions have been summarized in this chapter.

Research Question One

What are teachers' perceptions when considering the value of technology integration in literacy instruction?

An analysis of data, collected through survey responses and interviews, was completed by the researcher to answer the first research question. Overall, data exposed

four themes related to research question one. These themes were technology for reading and writing, engagement, student achievement, and assessments. Across all grade levels, data indicates that many educators believe technology integration enhances student engagement and supports students' overall literacy development. The first theme to develop reflects insight from participants who work with students from kindergarten to fifth grade. Data show that participants are utilizing technology to support their students' reading and writing skills. During the survey, participants were given the opportunity to choose more than one response to reflect literacy skill areas in which technology is used. Of these participants, 80% (n=16) agreed that foundational reading skills are supported by technology integration. Additional data yielded from the survey indicate that 80% (n=16) of participating educators incorporate technology into literacy instruction to specifically support reading comprehension. Furthermore, this group of participants utilize technology to support word study (55%), phonemic awareness (50%), phonics (45%), and fluency skills (35%). Further analysis of the data was completed to determine literacy skills that have been found to be positively impacted when technology is used. Of the survey responses, 50% (n=10) of participants believe that comprehension is positively impacted when technology is used. Additional reading skills perceived to be positively impacted by the use of technology were phonics (40%) and phonemic awareness (35%). Interview data augmented these findings.

Four out of five interview participants utilize 1-to-1 devices to support students' reading. These participants stated that the personal device provides student access to individualized text to differentiate reading levels, genres of text, and styles of books. Utilizing an iPad or Chromebook provides students an opportunity to experience a range

of text levels which grants them access to a greater range of peer reading groups. One interview participant explained that students with a lower reading ability can access more challenging text by listening to the books, instead of reading them. This allows students to connect with peers who have different reading levels. When considering grade levels that utilize technology for reading, the researcher found no discrimination across kindergarten to fifth grade.

When considering if technology integration supports foundational writing skills, data were divided based on participant feedback. Of the participants, 55% (n=11) of educators agreed and 45% (n=9) disagreed that technology helps students acquire the necessary skills for foundational writing skills. Further analysis of data indicated that students' grade level influenced this finding. Participants who teach kindergarten through third grade do not perceive technology as supportive as teachers who work with students in fourth and fifth grade. This data yields that teachers with younger students perceive that technology is not as beneficial for their students when learning foundational writing skills.

Additional data was reviewed to consider areas in which technology supports writing development. Data reveal that technology is not used as frequently during writing instruction and skill practice as reading instruction. Within the survey, multiple-choice questions allowed participants to choose all skill areas that apply. Participants were asked to provide literacy skills in which technology is used to teach writing. Of the 20 participants' responses, technology is used to support student achievement in vocabulary (30%), planning, revising, and editing (30%), and writing composition (30%). Three (15%) of the 20 participants use technology to support sentence structure. Two interview

volunteers, I1 and I5, mentioned writing when reflecting on technology integration for literacy instruction. I5 works with fifth-grade students and perceives technology to be very supportive of students' overall writing abilities. This participant gives students the option to use technology for the entire writing process, from brainstorming to publishing their writing. Although the choice is given to use paper and pencil, all students use their personal iPad for each part of their writing process. I5 feels that this option saves students time, permits them to receive immediate feedback, and allows them to edit and finalize their work more efficiently. I1 teaches third-grade students and feels that technology provides children a chance to focus on their overall writing, not spelling or sentence structure. The other interview participants worked with students grade two or younger. These interview participants did not mention writing when speaking about incorporating technology into their literacy instruction.

Data reveal a second theme that reflects increased student engagement when technology is used for whole-group or individualized literacy instruction. The survey revealed that 95% (n=19) of participants believe that student engagement increases when technology is used during literacy instruction. The only participant to select an opposing point of view was a first-grade teacher. Furthermore, all five of the interview participants reflected on this notion. The five interview participants have observed their students' engagement increase when utilizing technology for whole-group lessons and for individual skills practice on the iPad or Chromebook. Student engagement has been seen in the form of increased willingness to read, complete assigned individualized remediation, and editing personal writing.

The third theme that resulted from the survey and interview questions was related to assessing student achievement. Educators regularly assess their students' knowledge to gather evidence of achievement over time. After utilizing technology to support literacy instruction, 100% (n=18) of the educators who participated in survey question seven stated that they use observation as an assessment tool. During the interview process, volunteer I2 mentioned that observation is used during literacy instruction and it enhances her pedagogy. This educator is able to adjust students' reading content and writing goals as she observes them. Additionally, 66% (n=12) of the participants who answered multiple-choice question seven utilize formative assessments as a tool to gather evidence of student achievement, and 50% (n=9) of the participants use Fountas & Pinnell to assess students' reading progress. It is important to note that two participants added a comment to the section labeled "other." The first comment read "I cannot contribute technology to the gain in skills" and the other said, "not in any." These two responses identify two participants who may not have the ability to understand the connection that is possible between content knowledge and technological knowledge.

The fourth theme to emerge when considering the value of technology integration for literacy instruction was that teachers believe technology integration supports their students as readers and writers in the 21st century. Eighty-five percent of participants agreed or strongly agreed that technology integration supports their students' ability as readers in the 21st century. When participants were asked to consider technology as a tool that supports their students as writers in the 21st century, 60% (n=12) agreed that it does. Although the data displays more participants who believe technology supports their students reading in the 21st century, further analysis discovered that teachers, in grades

kindergarten through second grade, do not utilize technology for writing as often as participants who teach students in third through fifth grade. Additionally, interview participant I1 spoke in favor of technology to support students, but also made it clear that technology use must be intended to enhance student learning through projects and exploration, not rote reading or listening to books. I5 also felt that students who utilize technology for reading and writing demonstrate an ability to transfer their skills in communicating and collaborating with peers. I5's students utilize computer applications, such as Teams and OneNote to receive teacher feedback and to take notes during lessons. I5 stated that students learn to use technology quickly and it is more efficient than paper and pencil methods, resulting in more experienced readers and writers of the 21st century. It is clear that technology integration is valued by the participants of this study.

Overall, four themes emerged from the data related to the first research question. The first theme revealed that participants are utilizing technology to support their students' reading and writing skills. Also, data uncovered a second theme related to positive student engagement when technology is involved in the learning process. Third, observation and formative assessments were found to be common forms of assessment when considering student knowledge after technology was used. Finally, the fourth theme identified that participants perceive technology to enhance students' abilities as readers and writers in the 21st century.

Research Question Two

What are teachers' perceptions of their own technological pedagogical content knowledge (TPACK) during literacy instruction?

An examination of data associated with research question two revealed teachers' perceptions towards their technological pedagogical content knowledge during literacy instruction. Data was gathered using 11 Likert-scale statements and two interview questions. Within the data related to research question two, four themes emerged. Those themes were content knowledge, technology knowledge, technological pedagogical content knowledge, and time.

The first theme that emerged was content knowledge. Content knowledge is an educator's understanding of the literacy continuum within their grade level, and teaching it without the implementation of technology. Data from the current survey show 95% (n=19) of the participating teachers feel confident in their content knowledge of the language arts curriculum within their grade level. Also, of these participants, 90% (n=18) agreed or strongly agreed that they feel confident in differentiating their students' reading experiences without the use of technology. These same participants considered their ability to differentiate their writing instruction for a variety of academic abilities and 85% (n=17) agreed or strongly agreed that they feel confident in doing so. This data indicates that across all grade levels the teachers feel confident in teaching a variety of learners, without technology. During personal interviews, the researcher gathered insight into the participants' perceptions of their literacy content. All five of the interview participants feel that they can generalize their curriculum and differentiate reading and writing materials as students need them. Overall, the volunteers who participated in the survey and interview feel confident in their content knowledge of English and language arts.

The second theme that transpired based on research question two was participating educators' technology knowledge. Technology knowledge "is an educator's

knowledge of available technological tools and their ability to achieve selected tasks” (U.S. Department of Education, 2016, p.1). Survey and interview responses revealed that most educators are comfortable with their capability to use technology. Of the survey participants, 95% (n=19) feel confident in their ability to learn new technology skills that will support their literacy instruction. More data was reviewed based on the number of years participants have worked in their grade level. There was a general consensus across the years of service that all individuals feel confident in their ability to learn new technology. Interview data supported this as all participants said they use technology regularly in their classrooms. I1 and I2 added, as teachers in their current grade levels for over 20 years, that they will explore technology on their own before seeking professional development support during their scheduled time for classroom preparation.

The third theme that arose from survey and interview data was teachers’ perceptions about their own technological pedagogical content knowledge. Participants in this study feel confident in their ability to use technology for whole-group instruction and less for individualized skill practice. The current study analyzed how a teacher’s overall technological pedagogical content knowledge supports individualized student achievement in elementary classrooms. Technological pedagogical content knowledge is a teacher’s ability to “interpret curricular standards and goals and make that content accessible to learners through their instruction and the integration of digital technology” (Hutchison & Woodward, 2014, p. 457). Survey data reveal that 75% (n=15) of the participants believe their teaching pedagogy is supported when technology is included in the instruction. Of the five participants who disagreed, three were kindergarten teachers, one was a first-grade teacher and one was a third-grade teacher. It is important to note,

research findings from survey statements 10 and 11 indicate that these primary educators perceive technology as less impactful to their students' foundational reading and writing instruction. This reduced need for technology for younger students to learn foundational skills may interfere with an educator's willingness to utilize and learn technology. When educators have strong technological pedagogical content knowledge, they can integrate technology into their literacy instruction as a supplemental learning tool.

Of the 20 survey participants who provided feedback about their ability to merge technology with instruction, 70% (n=14) feel confident in their ability to differentiate instruction for a variety of academic levels within reading instruction, with the use of technology. However, it cannot be overlooked that 30% (n=6) disagreed and do not feel confident implementing technology to support diverse reading abilities within their classroom. Additionally, when educators were asked about their confidence and utilizing technology to support various writing abilities, 60% (n=12) feel confident in doing so. Of these participants, 40% (n=8) do not feel confident in their ability to differentiate instruction for a variety of academic levels within their writing instruction, with the use of technology. Survey data indicates that more than half of the participants feel confident in their technological pedagogical content knowledge for reading and writing instruction.

Based on the third theme, which was technological pedagogical content knowledge, all interview participants noted that they utilize technology for more than one literacy skill during the school day. These educators felt confident in their ability to access technology for teaching skills such as fluency, comprehension, and word study in a whole group setting. Teachers from each school district have access to a ClearTouch, Smartboard, and/or an ELMO for instructional support. Additionally, each interview

participant mentioned utilizing technology to expand upon the text genres and text levels presented to students, allowing children more flexibility with book choices and building their classroom community.

In addition to a whole-class setting, technological pedagogical content knowledge relates to a teacher's ability to recognize how to incorporate technology into literacy practice to support each learner individually. Only two of the five interview participants stated that they feel confident in utilizing technology to support students' individual writing and reading skills. In order to support individualized learning needs, and the growing demand for students to become independent in the use of technology, school districts have implemented personal learning devices. It is important to consider current educators' perceptions of their ability to provide enrichment or remediation to support their student's achievements with these devices. Of the participants who took the survey, only 50% (n=10) agreed that they know how to provide students with individualized remediation using a one-to-one device. The other half of the participants either disagree or strongly disagreed about their ability and knowledge to provide each student with remediation or enrichment using the personal learning device. More specifically to reading instruction, 60% (n=12) agreed that they feel confident in their ability to differentiate reading skills with a student's personal device. Specifically, for individual writing abilities within the classroom, 60% (n=12) of participants feel confident in differentiating student tasks with a personal device. To supplement this data, 100% of the interview participants utilize one-to-one learning devices in their classroom, but only one participant, I5, felt secure in assigning individualized work specific to students' learning

needs. The other four interview participants stated that they utilize reading apps that provide students with guided choices for reading content only.

The fourth theme associated with research question two was time, or lack thereof, as it creates a barrier that impacts technology integration for literacy instruction. Of the survey participants, 65% felt as though they do not have enough time during the school day to incorporate technology into the literacy curriculum. Further analysis of a lack of time to incorporate technology revealed that the participant's years of service did not influence their response. Additionally, I1 shared insight about School District One's new literacy program intended to be instructed completely from digital resources. Although whole-group instruction occurs on a Smart Board, this educator cannot find time during the school day to incorporate project-based learning or individualized activities that use technology.

Participants in the study made it clear that the lack of time creates a barrier to expanding their technological pedagogical content knowledge. During the interviews, 100% of the participants said that time acts as a barrier that negatively affects their ability to explore new technology for the purpose of enhancing their literacy content. Furthermore, 100% of interview participants agreed there is not enough time devoted to professional growth in the area of meaningful technology usage, which will be examined more in-depth for research question three. All five of the interview participants agreed that more time is needed to reflect with colleagues about beneficial methods for technology integration.

Overall, the themes that emerged to support the second research question reveal that the participants have strong content knowledge and technological knowledge.

Participants feel secure in their ability to provide individualized instruction for reading and writing to enhance student achievement. These participants also feel confident in learning new technology features that will enhance their literacy instruction.

Nevertheless, time or lack thereof has been identified as the most challenging barrier to overcome. Participants would like time to explore features on their students' personal devices to provide more meaningful individualized instruction and time to work with knowledgeable colleagues who could share ideas to support technology integration more efficiently. Finally, the participants would prefer more time to support students in choosing appropriate books for their age and reading levels.

Research Question Three

What are teachers' perceptions of the role of professional development in the implementation of technology in elementary literacy classrooms?

Two multiple-choice questions, eight Likert statements, and two interview questions generated data based on research question three. Within the findings related to research question three, two common themes emerged. The first theme was methods of professional development participants have received in the past five years and the impact on student achievement. The second theme reflected the role of professional development to provide the most impactful professional training to enhance teachers' technological pedagogical content knowledge.

Methods of professional development was found to be the first theme that arose from the current study. Data reveal that in the past five years participants have received professional development in the form of online sessions and in-person training most

often. Of the survey participants, 100% (n=20) have received online sessions to enhance professional growth. In addition to online sessions, 80% (n=16) of participants have experienced in-person training, and 50% (n=10) were sent videos from their school district. Fewer participants experienced single-session seminars, in-classroom observation, periodic workshops, peer mentoring, and time for reflection.

Although the survey participants provided data about the various types of professional development opportunities offered by their school districts, additional survey questions asked participants which of the professional development opportunities were most impactful to their teaching practices. Of the participants, 45% (n= 9) perceive that online sessions, which was seen by all of the survey participants, have positively supported their instruction. Also, only 10% of survey participants agreed that the videos sent by their school district, which half of the participants received, positively impact their teaching practices. Finally, data found that in-person training, which was experienced by 80% of the volunteers, was the most impactful method of professional development provided to the participants in the past five years, as indicated by 90% of the volunteers who received it.

It is important to note that when all interview participants were asked if their school district offers professional development opportunities related to technology integration for literacy instruction, all five responded with the answer “no.” Each participant was asked to expand on this notion and I3 and I4 stated that they learn new methods of technology integration from their grade-level peers. All interview participants said that they value insight from colleagues who have had success with technology integration and who share their experiences of student achievement.

Within the theme of types of professional development, data found that teacher mentors would be valued by participants. Of the survey responses, 95% (n=19) agreed that a mentor teacher who is given adequate time to teach how to combine language arts and technologies would be of great use. All interview participants stated that they would prefer a mentor to show them how to use students' personal learning devices to provide more in-depth remediation or enrichment based on literacy skills within specific grade levels. During the interview, the researcher mentioned to each interview participant that their school district does in fact have a technology coach. All interview participants were surprised by this. They did not know a technology mentor was available to them. Finally, when analyzing all data related to peer mentors, 80% (n=16) of survey participants do not feel confident in their own ability to act as this mentor. Mentors would be a valued option for professional development.

The second theme that emerged was the role of professional development in providing teachers with training to improve individual technological pedagogical content knowledge. Data from the survey reveal that 95% (n=19) of participants have not received professional development to enhance their technological pedagogical content knowledge. Interview data gave similar findings when all five were asked if their district offers professional development opportunities related to technology integration for literacy instruction. In fact, all five of the interview participants answered "no". Each participant was asked to elaborate on this information. All participants said they are not being offered scheduled or organized professional development opportunities to enhance their technological pedagogical content knowledge. I1, I2, and I4 find personal time to explore program features but explained it is not enough for thorough understanding. Even

with a new literacy program, School District One has not provided employees with specialized training.

Participants have not received the professional training needed to support the amount of technology utilized in the classroom. Of the two school districts used in the study, both offer all students, kindergarten through twelfth grade, a personal learning device. Among the surveyed participants, 95% (n=19) disagreed that they have received professional development about how to combine the language arts curriculum with one-to-one device applications to provide students with writing practice. Of these participants, 90% feel the same way about professional development offered to support students reading achievement with a personal device. This is alarming as 95% of these educators feel confident in their ability to learn new technology. Three of the five interview participants mentioned that apps are uploaded onto their students' 1:1 devices and classroom teachers are only provided with a brief overview about the app and student log-in codes. All three participants expressed the need for more time to explore these apps in order to utilize them to their fullest potential.

This research study found that interview participants use personal time to connect with more knowledgeable colleagues about the application and its educational features. These knowledgeable colleagues share what they know and act as a mentor for an alternative form of professional training. In-person or peer mentor training has been voiced to be the most desired and useful form of professional development for literacy instruction and technology integration. Of the five interview volunteers, 100% mentioned professional development opportunities that focused on improving their technical knowledge related to features on their students' personal devices that support specific

literacy skills would be of great use. The role of technology professional development has been considered and current educators believe it is to provide purposeful integration strategies to support individualized student achievement.

The final theme found was the role of professional development to provide impactful professional training to enhance teachers' technological pedagogical content knowledge. Professional training that does this would provide classroom teachers with information and strategies about available technology and methods which can be used to enhance all students' literacy skills. The data indicate that educators do not receive adequate time to explore and prepare instruction with different technologies. Of the survey participants, 80% (n=16) agreed that they do not have time to reflect during professional development about how to use technology for reading instruction. Furthermore, 95% (n=19) of the survey participants believe they do not have time to reflect on ways to use technology for writing instruction. To support this, three of the five interview participants suggested that school districts offer teachers time to explore specific technology features with grade-level colleagues. Additionally, these three participants suggested that more time is devoted to independent research for resources related to their literacy content. Opportunities to learn more about the applications would provide teachers with the knowledge to differentiate and enhance their students' individualized tasks. Interview participants stated more time to explore purposeful use of technology would provide opportunities to make educated and informed decisions about offering students project-based learning methods and enhance students' 21st-century literacy skills.

Survey data found two themes related to research question three. The themes were types of professional development and the role of professional development. Generally, participants felt that in-person training impacted their literacy instruction over all other methods. Also, the role of professional development is to provide educators with professional development opportunities that provide differentiated training to focus on one content area. Additionally, time with more knowledgeable peers to learn and explore application features would be highly preferred. These professional learning options should be associated with the technology tools in the classroom and applications already available to students. These opportunities would support each teacher's current knowledge, enhancing their overall technological pedagogical content knowledge and diminishing personal barriers.

Limitations Found in the Study

In Chapter One, limitations were recognized that may impede this qualitative study from being generalizable to all elementary schools with a one-to-one personal device for all students. Also, data is limited to the two school districts in southeastern Pennsylvania that provided access to teacher participants. Of the 11 superintendents across southeastern Pennsylvania who were provided with all information about the study, two provided consent to continue. As a result, data is limited to the two school districts in southeastern Pennsylvania that provided access to teacher participants. This limits the sample size of the study.

The consenting school districts presented this qualitative study to their K-5 elementary educators. Of these educators, 29 consented to the online survey and five volunteered for the interview. The sample size was limited because this research study

only asked K-5 classroom teachers to participate. Also, the number of participants may have been impacted by the current teacher shortage as potential participants may not have responded due to various priorities that outweigh their survey responses. A larger sample size would have provided the researcher with additional data to be analyzed based on teachers' perceptions of technology integration and professional development for literacy instruction.

After consenting to the online survey, participants were allowed to skip any question they could not or did not want to answer. While most of the participants answered all questions, there were nine participants who did not answer any questions in the survey. Also, 50% of the online surveys were completed by kindergarten teachers. This may have limited the data because the researcher found that kindergarten students do not utilize technology as frequently as students who are in third, fourth, or fifth grade.

Relationship to Other Research

Data analysis for this qualitative research study gathered results from a survey and personal interviews to obtain teachers' perceptions about teaching literacy content with the support of technology. Key themes that emerged from this data collection were elements that contribute to the overall success of teachers' literacy instruction. These themes included the value of technology for reading and phonics achievement, student engagement, assessing student achievement, the value of technology for 21st-century reading and writing skills, content and technology knowledge, technological content knowledge, time, methods of professional training, and technological pedagogical content knowledge.

The current study supports other research findings from Wilkes et al. (2020) who found students made significant improvements in phonological and reading skills after computer-assisted instruction was integrated into their literacy routine. This current study found that technology integration provides students with rich literature that motivates students to read, and engages children in foundational reading skills such as phonics and word study. Additionally, data from this study, which reflects findings from Lawrence et al. (2020) and Lovell and Phillips (2009), indicated that educators recognize progress in their student's achievements in the areas of comprehension, phonics, and phonemic awareness after technology is integrated into individualized reading instruction.

The findings from this study support prior research conducted by Aghajani and Adloo (2018) and Baker and Lastrapes (2019). Research data discovered that students' overall quality of writing improved and teachers were able to provide scaffolded support to their students during writing instruction and practice. Data from the current study revealed students' engagement and communication increase significantly when they utilize technology for writing. Educators today can provide their students with timely feedback and scaffolded support. This increased ability to communicate with students during the school day is a recommendation from the National Assessment Governing Board (2020) and can be done more regularly with a 1-to-1 device. Additionally, the results of this study aligned with research by Morphy and Graham (2018) who found that teachers' use of technology, such as Word processing, supported their students' overall achievement by creating a positive shift in motivation and organization of the writing. Survey and interview data from this study revealed the same findings related to students' overall ability with their writing composition.

Picton (2019) stated that utilizing technological devices for literacy instruction led to more positive learning experiences because children were observed with increased motivation to read, their enjoyment for reading intensified, and access to technology improved the students' overall confidence. Results from the current study showed the same findings. Ninety-five percent of the participants perceive technology integration during literacy instruction increases student engagement. Additionally, interviews from this current study revealed that technology integration encourages students of various abilities to engage with each other during reading and writing. These findings support prior research from Picton (2019) and Hol and Aydin (2020) who found that technology devices led to more positive learning experiences, enhancing students' outcomes of the learning target.

This current study found a theme associated with assessments. Participants indicated that they utilize observation and formative assessments most often. However, this data does not represent achievements based on technology integration alone. The current research study refutes past research by Inan et al. (2010) and the National Association for the Education of Young Learners (2012) who recommend the exploration of technology before young learners are assessed on their acquired knowledge. Additionally, Wilkes et al. (2020) reported that online programs provide educators with an online dashboard listing grade-level literacy skills assessed during student use. This would benefit current educators while implementing technology for the enrichment or remediation of skills and has been added as a recommendation for further research.

Findings from Lowther et al. (2012) and Harris et al. (2016) proclaim that access to a 1-to-1 device allows teachers to provide immediate feedback and offers more

information on topics of study. Also, Cho et al. (2018) and Lowther et al. (2012) discovered that students feel more confident entering the workforce after daily use of their 1-on-1 device. The findings from this research study align with these conclusions. Participants from the current study perceive that technology interaction improves their students' abilities as readers and writers in the 21st century. In addition, the International Society for Technology in Education (2022) encourages students to empower their learning by the use of technology to take an active role in achieving learning objectives. The majority of participants from the current study perceive that technology integration in the classroom supports students' ability to take ownership of their reading and writing by self-selecting books, internalizing immediate teacher feedback during writing, and utilizing a personal device to communicate with other students. Also, participants from the current study perceive technology integration improves their students' ability to access current research, expand on text topics and features, and support a collaborative classroom community.

Data from the current study made it clear that participants have sufficient content knowledge about the English and language arts curriculum at their grade level. Also, in this study participants feel confident when considering their technology knowledge. However, when participants were asked if they could use technology features on a 1-on-1 device to provide remediation or enrichment for their students, more than 55% said they do not feel confident in doing so. This data replicates data found by researchers, Lee and Tsai (2010) and Sherer et al. (2017) who discovered that an educator's confidence was a major predictor of their willingness to use technology for instruction. In order to provide purposeful learning experiences, such as enrichment or remediation, the International

Society for Technology in Education (2022) and Mangen (2018) recommended that educators have the ability to identify students' needs and merge best practices in literacy instruction, course content, and digital technology. However, this current research study found that participants do not feel confident in their ability to provide this rich and individualized literacy practice. All of the participants in the current study stated during their interview that they utilize a 1-to-1 personal device to expose students to the literacy content, however, all do not provide individualized practice.

Similar to past research, 100% of the educators who participated in the online survey and interview stated that time is a valued commodity that is difficult to find. Altun (2019) and McKenney et al. (2015) found that educators had apprehensions about the time necessary to teach their students technology skills. Participants from the current study feel as though this barrier interrupts the planned usage of the technology device. Only one interview participant stated that students are prepared to use technology for reading and writing, and their skills are developed in the grade level prior. Additionally, participants in the current study would prefer more time with student learning devices in a structured professional development format to explore and plan for content specific lessons. These findings support prior research completed by Paratore et al. (2016) and Darling-Hammond (2017) who believed teachers need adequate amounts of time to prepare evidence-based literacy lessons.

Personalized professional development was a topic that arose from the current research that reflects prior research findings. During personal interviews, educators continued to mention the need for purposeful professional development. These participants said they have not received any professional development related to

meaningful technology integration for literacy instruction in the past two years. All of the participating educators stated that they have received online sessions to support their technology professional growth in the past five years, however, only 45% stated that this method was effective. These findings reflect those from Mouza et al. (2014) who recommended that professional development be flexible as technology changes rapidly. Also, Lawless and Pellegrino (2007) add that educators must be actively engaged in order to develop an understanding of the application tool. This recommendation reflects feedback from interview participants I2, I3, and I5. These participants recommended professional development options where teachers can choose their level and area of need. According to the survey, more than 85% of educators are not satisfied with district-based professional development when considering its effectiveness in combining a language arts curriculum with a 1-to-1 device. These findings support prior research from Bowman et al. (2020), Clark and Boyer (2016), and Odajima (2019) who believe professional development should be based on individual teachers' needs for technology integration.

Finally, this research study aligned with data found by Bowman et al. (2022), Hutchison and Woodward (2018), and Wake and Whittingham (2013) who discovered that educators did not receive specially designed professional development that merged technology with literacy instruction. These scholars stressed the importance of professional development opportunities that meet teachers' pedagogical needs, be individualized for a range of experiences, and be specific for use in a particular subject area. The current study reflects this as interview participants stressed the need for peer models to witness how to integrate technology into whole-group instruction and individualized student practice. Similarly, Bowman et al. (2022), Hutchison and

Woodward (2018), and Wake and Whittingham (2013) found the practice of mentor teachers, who can model technological techniques to their colleagues, is beneficial to an educator's technological pedagogical content knowledge. Comparably, this current study found that all five interview participants thought a mentor teacher, who teaches the same grade level curriculum, would benefit their technological pedagogical content knowledge.

Recommendations for Further Research

The goal of this research was to analyze the perceptions of current educators about their use of technology for literacy instruction and the role professional development has in this implementation process. With the growing demand for efficient technology use in the workforce, educators must be more aware of their use of technology and their students' digital literacy skills (Reddy et al., 2020). Educators today provide a unique perspective as one-to-one digital initiatives have increased the availability of technology to students of all ages. Based on the results of this study, further research exploring the following elements of literacy education with technology is recommended:

1. The data collected in this study consisted of only input from teachers.

Additional research that gathers the perceptions of current administrators could provide a valuable perspective on professional development options offered to teachers.

2. Participants in this study indicated that their students utilize a one-to-one device daily, but they do not receive adequate training about applications that may support individualized remediation and enrichment. Additional research

related to specific applications that support individualized literacy skills would prove useful for student achievement.

3. Participants in this study indicated a variety of assessment tools used to determine student achievement. However, this data did not specify which assessments are best suited to determine student achievement based on technology implementation. Further research to determine assessment tools that monitor student achievement resulting from technology integration would benefit literacy instruction.
4. Results of this study indicate a need for more time for teachers to explore and expand on their technological content knowledge. The results suggest that further research needs to be conducted about how time for exploration and reflection can be added to professional development opportunities.

Conclusion

Three research questions guided the study to determine the effectiveness of technology integration for student achievement and the role of professional development as training opportunities for elementary educators. The data of this study were collected through an online survey and follow-up interviews within two southeastern Pennsylvania school districts. Teachers involved in this study teach English and language arts to students in grades kindergarten to fifth. Data gleaned from five multiple-choice questions, 24 Likert-scale statements, and five predetermined interview questions were examined to discover emerging themes concerning technology integration.

In summary, the data disclosed that technology integration for literacy is valued by the participants of the survey and interview, despite the number of years teaching their

current grade level. When technology is integrated into literacy instruction, participants see an increase in students' reading and writing abilities through observations and formative assessments. Additionally, participants perceive technology integration to support their students as developing writers and readers in the 21st century. Furthermore, data from this research study reveal that participants feel confident in their content knowledge and their technology knowledge. Nevertheless, participants stated that they do not receive beneficial professional development that supports their technological pedagogical content knowledge for individualized literacy instruction. Research from this study found that current educators do not feel successful in planning purposeful lessons for use on students' personal learning devices. Data discloses that these participants would like more professional training to support this. Also, data found that the most impactful professional development sessions are in-person training, yet, participants are rarely offered them by their school district. Furthermore, data exhibits that participants require planned and organized professional development time devoted to exploring literacy applications and with knowledgeable mentors.

This qualitative study supplements existing data that focused on teachers' perceptions of technology integration within literacy instruction to support student achievement and to highlight teachers' perceptions about their own pedagogical content knowledge. The purpose of this study was also to gather insight into teachers' perceptions about the role of professional development as it relates to technology integration within a classroom. Findings from the research may be used by districts when identifying current trends in technology integration for literacy instruction and ways to support teachers' professional abilities to enhance students reading and writing experiences.

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Appendix A

Teacher Survey

1. By clicking yes to the question below, I consent to participate in a study conducted by Jessica Paraschak, a doctoral student in the Education Division at Immaculata University. I read the Information Letter and have made the decision to participate based on this letter. I have had the opportunity to ask questions or receive additional details I wanted about the study. I understand that I may withdraw my consent at any time without penalty. I know that I may contact the researcher at jparaschak@mail.immaculata.edu or the researcher's advisor, Dr. Kelly Doyle, kdoyle@immaculata.edu, at any time if I have questions about the study. I understand that this research study has been reviewed and approved by the Research Ethics Review Board at Immaculata University, and I may contact that office, Dr. Marcia Parris, mparris@immaculata.edu, if I have any concerns or comments with my involvement of this project. Do you consent to participate in this study?
 - a. Yes, I agree.
 - b. No, I do not agree. I choose not to participate in this study. By clicking no, you will automatically exit the survey.

Directions: Please read each section and select the appropriate answer.

1. What grade level do you teach?
 - a. Kindergarten
 - b. Grade 1
 - c. Grade 2
 - d. Grade 3
 - e. Grade 4
 - f. Grade 5
2. How many years have you been teaching in this grade level?
 - a. Less than 5 years
 - b. 5-10 years
 - c. 11-15 years
 - d. 16-20 years
 - e. More than 20 years
3. For how many years has your elementary school provided access to one-to-one devices for students in your grade level (for example: portable ipad carts, class set of laptops)?
 - a. Less than 1 year
 - b. 1-2 years
 - c. 3-4 years

- d. 5-6 years
- e. More than 6 years

2. For which skill areas have you used technology to support student achievement?

<input type="checkbox"/> Phonemic awareness	<input type="checkbox"/> Word study	<input type="checkbox"/> Phonics	<input type="checkbox"/> Comprehension	<input type="checkbox"/> Fluency
<input type="checkbox"/> Vocabulary	<input type="checkbox"/> Sentence construction	<input type="checkbox"/> Planning, revising, editing writing	<input type="checkbox"/> Writing composition	<input type="checkbox"/> Other:
None of the above	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. I see an impact in my students' achievement in the following areas when I utilize technology:

<input type="checkbox"/> Phonemic awareness	<input type="checkbox"/> Word study	<input type="checkbox"/> Phonics	<input type="checkbox"/> Comprehension	<input type="checkbox"/> Fluency
<input type="checkbox"/> Vocabulary	<input type="checkbox"/> Sentence construction	<input type="checkbox"/> Planning, revising, editing writing	<input type="checkbox"/> Writing composition	<input type="checkbox"/> Other:

4. When technology is used in my classroom, I see evidence of student learning through:

<input type="checkbox"/> observations	<input type="checkbox"/> Summative (example: end of unit assessments)	<input type="checkbox"/> DIBELS assessments	<input type="checkbox"/> Teacher-developed assessments	<input type="checkbox"/> Fountas & Pinnell assessments
<input type="checkbox"/> District-created rubrics	<input type="checkbox"/> Student portfolio	<input type="checkbox"/> Formative assessments (example: emoji survey, exit ticket after lesson)	<input type="checkbox"/>	<input type="checkbox"/> Other:

5. Of the following types of district-based professional development options, what have you experienced in the last 5 years?

<input type="checkbox"/> In-person training	<input type="checkbox"/> Online sessions	<input type="checkbox"/> Videos sent by my school district	<input type="checkbox"/> 1 on 1 coaching	<input type="checkbox"/> Peer mentoring
<input type="checkbox"/> Periodic workshop	<input type="checkbox"/> Single-session seminars	<input type="checkbox"/> Time for Reflection	<input type="checkbox"/> In-classroom Observations	<input type="checkbox"/> Other:

6. In the district-based professional development you have participated in, which have you found has positively impacted your teaching practices?

<input type="checkbox"/> In-person training	<input type="checkbox"/> Online sessions	<input type="checkbox"/> Videos sent by my school district	<input type="checkbox"/> 1 on 1 coaching	<input type="checkbox"/> Peer mentoring
<input type="checkbox"/> Periodic workshop	<input type="checkbox"/> Single-session seminars	<input type="checkbox"/> Time for reflection	<input type="checkbox"/> In-classroom Observations	<input type="checkbox"/> Other:

Directions: For each statement, think of the age/grade of the students you teach and select the extent to which you agree or disagree with the statements below.

4. Incorporating technology into literacy instruction helps my students acquire foundational **reading** skills.

Strongly Agree Agree Disagree Strongly Disagree

5. Incorporating technology into literacy instruction helps my students acquire foundational **writing** skills.

Strongly Agree Agree Disagree Strongly Disagree

6. Student engagement increases when technology is integrated into my literacy instruction.

Strongly Agree Agree Disagree Strongly Disagree

7. Technology integration in my classroom supports students' ability as **readers** in the 21st century.

Strongly Agree Agree Disagree Strongly Disagree

8. Technology integration in my classroom supports students' ability as **writers** in the 21st century.

Strongly Agree Agree Disagree Strongly Disagree

9. I have sufficient knowledge about the language arts curriculum at the grade level I teach.

Strongly Agree Agree Disagree Strongly Disagree

10. I have enough time during the school day to incorporate technology into the literacy curriculum that I teach.

Strongly Agree Agree Disagree Strongly Disagree

11. I am confident in my ability to learn new technology that will support my literacy instruction.

Strongly Agree Agree Disagree Strongly Disagree

12. I believe my teaching pedagogy is supported when I integrate technology into my instruction.

Strongly Agree Agree Disagree Strongly Disagree

13. I am confident in my ability to differentiate instruction for a variety of academic levels within my **reading** instruction, **without** the use of technology.

Strongly Agree Agree Disagree Strongly Disagree

14. I am confident in my ability to differentiate instruction for a variety of academic levels within my **reading** instruction, **with** the use of technology.

Strongly Agree Agree Disagree Strongly Disagree

15. I am confident in my ability to differentiate instruction for a variety of academic levels within my **writing** instruction, **without** the use of technology.

Strongly Agree Agree Disagree Strongly Disagree

16. I am confident in my ability to differentiate instruction for a variety of academic levels within my **writing** instruction, **with** the use of technology.

Strongly Agree Agree Disagree Strongly Disagree

17. I am confident about the technologies I choose to enhance student learning during whole group literacy instruction.

Strongly Agree Agree Disagree Strongly Disagree

18. I know how to provide students with individualized remediation using a one-to-one device.

Strongly Agree Agree Disagree Strongly Disagree

19. I feel confident when teaching lessons that appropriately combine literacy, technologies and my personal teaching pedagogy.

Strongly Agree Agree Disagree Strongly Disagree

20. A mentor teacher who is given adequate time to teach me how to combine the language arts curriculum and technologies would be of great use to me.

Strongly Agree Agree Disagree Strongly Disagree

21. I am confident in my ability to serve as a mentor to teach other educators how to utilize a one-to-one device to support students' literacy skills.

Strongly Agree Agree Disagree Strongly Disagree

22. District-based professional development sessions have taught me how to combine the language arts curriculum and one-to-one device applications to provide my students with **writing** practice.

Strongly Agree Agree Disagree Strongly Disagree

23. District-based professional development sessions have taught me how to combine the language arts curriculum and one-to-one device applications to provide my students with **reading** practice.

Strongly Agree Agree Disagree Strongly Disagree

24. District-based professional development opportunities have caused me to think about how technology can positively influence students' literacy achievement-

Strongly Agree Agree Disagree Strongly Disagree

25. District-based professional development gives me time to explore and prepare my instruction with different technologies.

Strongly Agree Agree Disagree Strongly Disagree

26. I have time to reflect during district-based professional development about how to use technology for **reading** instruction.

Strongly Agree Agree Disagree Strongly Disagree

27. I have time to reflect during district-based professional development about how to use technology for **writing** instruction.

Strongly Agree Agree Disagree Strongly Disagree

As part of the data collection process, the researcher will be conducting interviews with participants. Your participation in an interview will take approximately 30 minutes and is optional. If you are willing to participate in the interview portion of this research, please click the link below to provide your contact information to the researcher. The researcher will then contact you to schedule an interview.

(Interview Participation Link)

Thank you for completing this survey. Please click on the done button to submit your survey response.

Interview Participation Link

Participant's Name _____

Participant's Email _____

Appendix B

Teacher Interview Questions

1. Currently, are you using technology during your literacy instruction (whole group, small group or individualized instruction)?
 - a. If yes, how is it incorporated into your teaching practices?
 - b. If not, what do you find most effective during your classroom instruction?
2. Are there barriers to implementing technology into literacy instruction in your classroom? (*professional barriers*: inadequate access to technology, lack of time, etc. OR *personal barriers*: limited knowledge of technology, lessons are already effective) If yes, how can you minimize them?
3. Do your students benefit from the use of technology integration into their literacy practices?
 - a. If yes, what type of technology do you find successful?
 - b. If not, what have you found as a successful method for teaching literacy content?
4. Does your school district offer professional development opportunities related to technology integration for literacy instruction?
 - a. If so, how does the district present the information to you, how often is the staff provided this information and do you find it beneficial?
 - b. If not, would you find it useful for your teaching practices? Why or why not?
5. In a perfect world, what would you like to see offered by your school district in terms of supporting your professional development in the area of technology integration during literacy instruction?

Appendix C

RERB Approval Form

IMMACULATA UNIVERSITY RESEARCH ETHICS REVIEW BOARD REQUEST FOR PROTOCOL REVIEW--REVIEWER'S COMMENTS FORM (R1297)

Name of Researcher: Jessica Paraschak

Project Title: Technology Integration in Elementary Literacy Classrooms: Teachers' Perceptions and The Role of Professional Development

Reviewer's Comments:

Your proposal is **Approved**. You may begin your research or collect your data.

PLEASE NOTE THAT THIS APPROVAL IS VALID FOR ONE YEAR (365 days) FROM DATE OF SIGNING.

Reviewer's Recommendations:

Exempt
 Expedited
 Full Review

Approve
 Conditionally Approved
 Do Not Approve

Marcia Parris

September 22, 2022

Marcia Parris, Ed.D.,
Chair, Research Ethics Review Board

Date

Appendix D

Information Letter and Consent Form for the Survey

Date:

Title of Project: Technology Integration in Elementary Literacy Classrooms: Teachers' Perceptions and the Role of Professional Development

Researcher: Jessica Paraschak
Immaculata University, Education Division
215-528-1246
jparaschak@mail.immaculata.edu

This letter is an invitation to participate in a research study investigating teachers' perceptions of technology integration into literacy instruction. Also, this study will examine teachers' perceptions of the role of professional development for successful technology integration. As an elementary school teacher who teaches literacy content, your administrative staff has granted me permission to invite you to participate in a voluntary electronic survey. The survey responses will provide information to support this research. After providing consent, the survey will contain 32 research questions. Three questions will provide demographic information, five questions will be in the form of multiple choice and 24 responses will be Likert-scale statements. The survey is estimated to take 20-25 minutes. Please complete the survey within the next three weeks. After completion of the survey there will be an invitation to participate in a follow-up interview. The interview will take place at a later date, in a place and time at your convenience (face-to-face, on the phone or virtually). There are no anticipated risks or benefits for participating in this study. There is no compensation for voluntary participants.

If you are interested in supporting this voluntary study, please complete the consent form below, which will provide a link to the survey. You will not be asked to provide any personal information on this survey, and you may decline to answer any questions presented during the study. Additionally, you may decide to withdraw from this study at any time by contacting the researcher, and may do so without penalty. All information will remain confidential and you will not be asked to submit any personal information for data analysis. The published dissertation will not have any personal information or names to identify participants. Data collected will be stored in a secure location that only the researcher has access to, or on the researcher's computer, which is locked with a secure password. Data stored in this protected location will be kept for five years, at which point it will be deleted permanently.

This study has been reviewed and approved by Immaculata University's Research Ethics Review Board. Should you have questions or concerns resulting from your

participation in the study you should contact the Review Board at 610.647.4400, Ext 3221.

The data collected from this survey will be done so under the supervision of Dr. Kelly Doyle. If you require additional information about the content of this study, please contact Dr. Doyle, at kdoyle@immaculata.edu or 610.329.6077. You may also contact me, Jessica Paraschak, at jparaschak@mail.immaculata.edu or 215.528.1246. All survey responses will be collected and viewed by me, the sole researcher of this project. All data will be anonymous and personal identities will not be known.

Please review the consent options below. You will indicate your consent by clicking the survey link and answering the first question at the beginning of the survey. Providing consent will not waive your legal rights.

Please allow me to thank you in advance for volunteering your time to support my research. Please complete the survey by (insert date). As a fellow educator, I know your time is extremely valuable and I appreciate your participation!

CONSENT FORM

By clicking yes to the question below, I consent to participate in a study being conducted by Jessica Paraschak, doctoral student at Immaculata University, Education Division. I have read the information letter and had the opportunity to ask questions to gather additional information I needed about the study. I understand that I may refuse or withdraw from the study at any point, without penalty, by contacting the researcher. I know there is no compensation for offering to complete this online survey. I know that I may contact the researcher at jparaschak@mail.immaculata.edu or the advisor at kdoyle@immaculata.edu at any time if I have questions about this study.

Also, I understand that this research proposal has been reviewed and approved by the Research Ethics Review Board at Immaculata University, and I may contact the office of Dr. Marcia Parris at mparris@immaculata.edu if I have comments or concerns about this study or my involvement in it.

Do you consent to participate in this study?

- Yes, I will participate in the study. ([Continue to the survey](#))
- No, I do not wish to participate in this study. By clicking no, you will automatically exit the survey. ([Continue to the survey](#))

Appendix E

Information Letter and Consent Form for the Interview

Date

This letter is an invitation to participate in a follow-up interview for my study. I am conducting interviews to extend my research and increase awareness of teachers' perceptions of technology integration into literacy instruction. I also intend for this research to support the role of professional development for technology integration. I am conducting this research as part of my Doctoral Degree in the Department of Education at Immaculata University under the supervision of Dr. Kelly Doyle. I would like to provide you with more information about this project and what your involvement would entail if you participate in this voluntary interview.

The interview consists of five questions and should take approximately 20-25 minutes in length and participation is voluntary. The interview can be conducted virtually, on the phone or face-to-face. Interviews will be conducted within the next three weeks at a location and time convenient to you. With your permission, the interview will be transcribed and recorded to enable collection of data and later used to supplement survey responses. The researcher will use a personal device that will be password protected, to record the interview. Please know that you may decline to answer any interview questions or stop the interview at any point by informing the researcher. After the interview is complete, you will receive a copy of the transcript so you can review our conversation for accuracy and clarify any points that you wish. All information will be considered completely confidential. During the interview you will not be asked to state your name and it will not appear in the research findings, however, with your permission anonymous quotations may be used. Data collected from this study will be stored in a locked box in the researcher's home, or on the researcher's computer, which is locked with a secure password. Data stored in this protected location will be kept for five years, at which point it will be deleted permanently.

If you have any questions about this study, or need additional information, please contact me at jparaschak@mail.immaculata.edu or 215.528.1246. You may also contact my supervisor, Dr. Kelly Doyle, at kdoyle@immaculata.edu or 610.329.6077.

As stated, participation in this study is voluntary and compensation will not be offered. I would like to assure you that this study has been reviewed by the Research Ethics Review Board (RERB) at Immaculata University and has received clearance. If you have any questions resulting from participating in this study please contact the Review Board at 610.647.4400, Ext 3221.

Thank you in advance for taking the time to participate in this research study. I look forward to speaking with you.

Sincerely,

Jessica Paraschak

CONSENT FORM

I have read the information provided in the letter presented by the researcher, Jessica Paraschak, regarding the study being conducted for the College of Graduate Studies at Immaculata University. I was provided an opportunity to ask questions related to the study, to review and amend my responses and add more details if needed.

I am aware that my interview will be recorded, with my permission, so the researcher has a more accurate understanding of the data provided.

I am aware that the researcher may use excerpts from the interview and include them, with anonymous quotations, in the dissertation and/or publications that follow this research.

I am aware that I may withdraw my consent, without penalty, by informing the researcher. I am aware that I will not be offered compensation for participating in the interview.

I am aware that this study was reviewed by the Research Ethics Review Board at Immaculata University and I may contact the Dr. Marcia Parris at mparris@immaculata.edu or 610.647.4400, Ext 3221 at any point with comments, questions or concerns.

With full knowledge of all information presented, I agree, on my own free will, to participate in this study.

- Yes
- No

I agree to have my interview recorded.

- Yes
- No

I agree that my anonymous quotations may be used in any thesis or publication that results from this research.

- Yes
- No

Participant's Name (please print)

Participant's Signature

Date _____

Researcher's Signature

Date _____

Researcher's Title: Technology Integration in Elementary Literacy Classrooms:
Teachers' Perceptions and the Impact of Professional Development

Department: Education

Faculty Advisor Signature

Date _____

Faculty Advisor Title

Department _____