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Perceptions of the Strengths and Challenges of 1:1 Learning in the Early Elementary Classroom

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Abstract

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MA, American College of Education, 2015

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Dissertation Submitted in Partial Fulfillment

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Abstract

The need for technology use has become a necessity in 21st-century classrooms. To accomplish this, more districts have been implementing 1:1 technology initiatives. In a 1:1 technology classroom, every student has their own device, such as a Chromebook or iPad. Although districts are increasing their 1:1 initiatives, little research has been done on early elementary teachers' perceptions of the use of 1:1 devices to support their current pedagogy and teaching in their classrooms. The purpose of this basic qualitative study was to use Koehler and Mishra's technological pedagogical content knowledge (TPACK) framework to investigate how Midwestern public school early elementary teachers perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills. Semistructured interviews were conducted with four K-3 teachers in a Midwest public school district that use 1:1 Chromebooks. Thematic analysis of the data was used through open-ended and pattern coding. Four themes emerged from the data: learning in the early elementary classroom, technology use in the early elementary classroom, strengths of 1:1 technology use, and challenges of 1:1 technology use. These findings provide insight into the teachers' perceptions of using 1:1 technology at the early elementary level and may provide information for districts as they seek to develop innovative 1:1 classrooms. This study may bring about positive social change by providing information that may help support teachers as they use an innovative 1:1 classroom to prepare early elementary students for 21st-century skills.

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Dedication

I would like to dedicate this doctoral study to my husband, Brandon, for always believing in me. You have been my rock through everything and I would not have completed this without you. To my kids, Brooke and Dean, you are my motivation for everything I do in life and I hope you know you can achieve anything you put your mind to. I would also like to dedicate this to my mom who has supported me through everything in my life and taught me to always go for my dreams. Finally, I dedicate this to my Nanny. I wish you could be here to see this finished but I know you would be proud.

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Chapter 1: Introduction to the Study

Schools are continuing to purchase new technologies and implement new technology programs as a way to prepare 21st-century learners for the future. Research suggests that simply having technology in the classrooms does not ensure that teachers are capable of using it effectively and purposefully in the classroom (Frazier & Trekles, 2018). In this study, I examined what strengths and challenges early elementary teachers in kindergarten through third grade (K-3) classrooms perceive are found in the 1:1 classroom environment (i.e., where each student is equipped with their own device, such as a Chromebook or iPad), and how the use of 1:1 technology supports pedagogy and content to impact students' academic achievement. As 1:1 initiatives are starting to be implemented more in elementary schools (Frazier & Trekles, 2018), it is imperative to have an understanding of the perceptions of teachers at the early elementary level on how this type of learning environment is impacting the learning of students. The findings from this study provide necessary insight into 1:1 initiatives at the early elementary level to provide information that may help support teachers as they utilize a 1:1 classroom environment in innovative ways to support pedagogy and content for student achievement in the classroom.

In Chapter 1, I explore the background knowledge of 1:1 technology initiatives which drive the purpose of this study, and the research question. I also provide information relating to the technological pedagogical content knowledge (TPACK) conceptual framework that was the driving force for this study and then describe the overall nature of this study. I provide necessary definitions, assumptions, delimitations,

and limitations that are associated with this study. Finally, I examine the significance this study may bring to the educational field to support teachers implementing 1:1 technology in their classrooms.

Background

In a 1:1 technology classroom setting, each student has their own individual device, such as a Chromebook or iPad. School districts have been increasing the implementation of 1:1 technology classrooms with the goal of reforming education (Heath, 2017). This increase in the use of technology creates a shift in how teachers teach students and how students learn. When every student has their own device, teachers become more of a facilitator and guide in the learning process (Frazier et al., 2019). Gherardi (2017) surveyed 252 and interviewed 20 K-8 teachers in a low-income Midwest school district and found that technology in a 1:1 technology environment increased opportunities for differentiated instruction and had an overall positive impact on student learning. Other studies have also found that 1:1 technology had a positive impact on student motivation and engagement in school (Harris et al., 2016; Lou & Murray, 2018.) The use of technology has also been linked to improvements in 21st-century skills such as communication, collaboration, creativity, and critical thinking (Onur & Kozikoglu, 2020).

As 1:1 initiatives are growing in school districts, there are challenges that some teachers may face when utilizing this technology in their classrooms. Frazier and Trekles (2018) examined the perceptions of K-5 teachers in the first-year implementation of a 1:1 iPad initiative and then followed up later on. The authors found several strengths and

challenges associated with this initiative in the first year. Frazier et al. (2019) followed up with the K-5 Midwest teachers in their second year of a 1:1 iPad initiative to examine the changes in a qualitative and quantitative analyses. They found that in Year 2 of this initiative there was improvement in collaborative activities and challenges with lack of professional development.

As teachers begin to incorporate technology more in the classroom, there is a need to understand how to effectively use technology for learning. Technology cannot be used in insolation as its own separate unit but should be incorporated into the curriculum to support 21st-century learning skills (O'Neal et al., 2017). Although every student may have a device in a 1:1 classroom, this does not imply that students will benefit from this technology unless teachers are able to effectively incorporate technology in ways that encourage student exploration, collaboration, and differentiation (Lawrence et al., 2017). A 1:1 technology classroom at the early elementary level will also require different approaches than upper grades (Frazier & Trekles, 2018) as the need to include appropriate hands-on activities is necessary for the developmental and social growth of young children (Quesenberry et al., 2016). There is a gap in the literature related to the perceptions of early elementary teachers utilizing 1:1 technology in the classroom. There is a need to understand what strengths and challenges these teachers are facing in utilizing 1:1 technology to support their pedagogy and content to impact student achievement in the classroom.

Problem Statement

In school districts across the nation, 1:1 initiatives are increasing; however, there is a gap in the literature on early elementary teacher perceptions of the strengths and challenges 1:1 technology has on instructional outcomes. Some teachers who are utilizing 1:1 technology believe that technology use positively influences students in their ability to develop communication and problem-solving skills (Condruz-Bacescu, 2020). Varier et al. (2017) found that teachers and students differed in their opinions on how 1:1 devices influenced the motivation of students: whereas teachers found students to be more motivated, students across different grade levels expressed different levels of motivation when using 1:1 devices. Teachers in a Midwest school district found the implementation of 1:1 technology to be a challenge, yet different teacher mindsets varied in how teachers handled that challenge (Gherardi, 2017). The specific problem this basic qualitative study examined was that teacher perceptions of the strengths and challenges of using 1:1 to support students' academic achievement in the early elementary K-3 classroom are unknown. At the early elementary level, the development of social skills and hands-on exploration is an important part of the early elementary classroom (Magen-Nargar & Firstater, 2019). Although these social skills are necessary, it is also important for students at the elementary level to begin to develop 21st-century skills using technology and develop a sense of digital citizenship (Johnston et al., 2018). Current pedagogical practices at the early elementary level must begin taking into consideration the best ways to incorporate technology into their instruction to support student learning in the classroom (Danniels et al., 2020). Understanding teacher perceptions of these early

elementary teachers is necessary to understand the strengths and challenges they are facing as districts utilize 1:1 initiatives.

Purpose of the Study

The purpose of this basic qualitative study was to investigate how Midwestern public school early elementary teachers perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills. In order to achieve this purpose, I examined a research question that focused on the strengths and challenges of using 1:1 technology specifically at the early elementary level to support the teachers' current use of pedagogy and content in the classroom to influence student learning. By developing an understanding of the strengths and challenges early elementary teachers are facing in 1:1 technology classrooms, the findings of this study provide insight into 1:1 technology initiatives at the early elementary level.

Research Question

The following research question was used in this study: How do public school early elementary teachers in a Midwest suburban region perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills?

Conceptual Framework

The conceptual framework for this study was Koehler and Mishra's (2005) TPACK framework. TPACK is a framework that examines how content, pedagogy, and technology influence each other in the learning process (Koehler et al., 2013). The TPACK framework builds upon Shulman's (1987) pedagogical content knowledge

(PCK) framework to incorporate technology knowledge. PCK is a teacher's understanding of how different elements of pedagogy, such as different teaching methods, theories, and learning styles of students, connects with different elements of content knowledge, such as students' prior knowledge or misconceptions of a concept (Koehler et al., 2013). TPACK adds in a teacher's technology knowledge as well. A teacher's technology knowledge should constantly be changing, growing, and evolving as changes and developments in technology occur frequently (Koehler et al., 2013). Although it is important for teachers to understand different technology, technology knowledge should not be viewed in insolation, but should be used in relation with pedagogical and content knowledge (Ozdemir, 2016). According to the TPACK framework, an effective teacher must consider how all three areas of content, pedagogy, and technology will work together in a classroom (Nelson et al., 2009).

I used the TPACK framework to support the design of this basic qualitative study. It was aligned throughout the research question and interview questions to develop an understanding of teachers' perceptions of the use of technology in their content and pedagogical approaches in the early elementary classrooms. The TPACK framework was used throughout the analysis process to examine the strengths and challenges early elementary teachers are facing when using 1:1 technology to support their current understandings of content and pedagogy.

Nature of the Study

A basic qualitative approach was used in this study to gain an understanding of how early elementary teachers perceive their experiences with 1:1 technology in the

classroom as instructional tools. Qualitative research is rooted in the methodology of seeking how people understand and interpret the world around them (Ravitch & Carl, 2016). According to Merriam (2009), basic qualitative studies are used to understand how people interpret experiences, construct their worlds, and the meaning behind their experiences. Because I sought in this study to gain insight into the perceptions of teachers, the basic qualitative method of utilizing individual interviews to collect and analyze data (Merriam & Tisdell, 2016) was appropriate.

The participants in this study consisted of four teachers at the K-3 level. I selected teachers from different elementary schools in an Illinois school district that currently utilizes a 1:1 technology program where each student has their own Chromebook. Purposeful typical sampling was used to allow for analysis of information-rich cases of the typical early elementary experiencing the phenomenon being studied (Patton, 2015). I interviewed each participant individually via the Zoom videoconferencing platform (https://zoom.us) in semistructured interviews lasting from 20 to 30 minutes. The interviews were transcribed and coded in Microsoft Excel. Thematic analysis was used to determine any emerging themes that aligned with the TPACK framework.

Definitions

1:1 technology classroom: A 1:1 technology classroom refers to a learning environment where each student has access to a personal computing device to use for learning in the classroom (Varier et al., 2017)

21st-century skills: This term refers to skills that are necessary for today's world such as the ability to question, think, produce, interpret, collaborate, and problem solve

(Onur & Kozikoglu, 2020) These skills of collaboration, communication, creativity, digital literacy and self-directed learning should be incorporated in the classroom for student learning (Varier et al., 2017.)

Content knowledge: Content knowledge is teachers' knowledge about the theories, frameworks, and concepts associated with the subject matter that is being taught (Koehler et al., 2013).

International Society for Technology in Education (ISTE) standards: The ISTE standards provide guidelines of technology skills to be incorporated by teachers into their curriculum including collaboration, digital literacy, computational thinking, and student empowerment (Trust, 2018).

Pedagogical content knowledge (PCK): PCK is the basis of connecting learning, teaching, curriculum and pedagogy and determining what different strategies and different means of learning are best for learning a concept (Koehler et al., 2013; Schulman, 2013).

Pedagogical knowledge: Pedagogical knowledge refers to a teacher's understanding of different teaching methods and theories current in education (Koehler et al., 2013).

Technological content knowledge: Technological content knowledge is the understanding of how technology and content influence each other, along with an understanding of how the content may be changed by the use of specific technologies (Koehler et al., 2013).

Technological pedagogical content knowledge (TPACK): TPACK is the understanding of pedagogical approaches that incorporate appropriate technology to teach content (Getenet et al., 2016).

Technological pedagogical knowledge: Technological pedagogical knowledge is understanding how using specific technology can influence teaching and learning (Koehler et al., 2013).

Assumptions

This study was built upon several assumptions. The first assumption was that participants understood the interview questions provided to them. This was a necessary assumption to ensure that participants could appropriately describe their experiences and perceptions of the 1:1 learning environment. A second assumption was that the participants had a foundation of pedagogy and content in the early elementary classroom. This was a necessary assumption as the participants expressed how technology was influencing the pedagogy and content in their learning experience of their students. A third assumption was that participants responded with honest and descriptive answers to interview questions that fully express the strengths and challenges they face in a 1:1 classroom. This was important in providing accurate and rich data to base an analysis on. A final assumption was that participants are utilizing 1:1 devices in their classrooms. Participants in this district all had devices in their classrooms as it was a district initiative and expectation. I am assuming that they were actively utilizing these devices in their classrooms.

Scope and Delimitations

The purpose of this study was to investigate how Midwestern public school early elementary teachers perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills. The participants consisted of K-3 teachers. This participant demographic was determined based on the gap in the literature in regard to K-3 teachers' perceptions of using 1:1 technology for learning in the early elementary classrooms. The basic qualitative research approach was chosen for this study as it allows the opportunity to gain insight and understanding of how people make sense of their lives and experiences (Merriam & Tisdell, 2016). The scope of this study was focused on interviewing K-3 teachers in capturing their perceived strengths and challenges in using 1:1 technology in the classroom. The participants in this study provided insight into the early elementary 1:1 technology classroom experiences which have not been specifically researched in this area.

The delimitations of this study included the selected population of participants. This study was focused on the perceptions of K-3 teachers in a Midwest suburban public school district based on the determined gap in the literature. The perceptions of teachers at the fourth and fifth grade level were not included, nor were those of middle school or high school teachers. Participants were also limited to one Midwest school district currently participating in a 1:1 technology program. Another delimitation included the type of devices students used. There are several options of devices that districts may use when implementing 1:1 technology in the classroom. This study did not focus on how the specific device may influence learning but focuses on the overall perception of the

strengths and challenges of a 1:1 technology classroom to support 21st-century learning at the early elementary level. The use of purposeful sampling based on specific criteria helped build this study's transferability through reader generalizability (Merriam & Tisdell, 2016).

Limitations

This study was accompanied by a few limitations. The transferability of any findings in this study acted as a limitation because I am specifically looking at K-3 teachers in one specific public school district in the Midwest. Due to the sample size and participants in this study, the generalizability of this study was limited. Another limitation was the learning and experiential gap between kindergarten and 3rd grade students. Although these grades are all considered early elementary, the experiences and development levels between these grades may vary. This basic qualitative approach was being utilized to allow for reader or user generalizability. In this type of generalizability, the reader of the study determines if the results of the study fit their specific needs (Merriam & Tisdell, 2016).

Due to my current role as a digital learning coach in the school district at the time of the study, the potential for personal and participant biases was present. I needed to ensure that my own biases and opinions were strictly removed from the study as I interviewed participants and analyzed the outcomes. Participants may have also come with their own biases or felt uncomfortable in their ability to answer truthfully to their interview questions based on my role with the district. Although I am still a member of the teacher union and am not superior in role to the participants, my role involves

coaching teachers and working with administration. Participants were selected from buildings that I did not support in my coaching role, and I ensured that participants were aware of the study's purpose and that their participation or responses were not being shared with district employees or administration.

Significance

The advancement in lightweight devices such as tablets and portable laptops that allow for a 1:1 technology environment provide enhanced opportunities for developing 21st-century skills (Varier et al., 2017). A goal of these 1:1 technology initiatives is to help students develop their technological skills, along with necessary 21st-century skills to be successful in the real world (Hallman, 2019). Teachers must understand how to effectively use this innovative instructional tool in a 1:1 technology setting as a way to enhance and support learning in the 21st-century classroom. By gaining an understanding and insight into the impact of these 1:1 technology programs, schools or districts can have a better idea of the necessary policies or procedures to put in place (Zheng et al., 2016). With the implementation of 1:1 technology in the classrooms at the primary grade levels, there is a need to understand teacher perceptions as they are teaching in a 1:1 technology environment. As advancements in technology continue to develop and change on a daily basis, so do opinions and ideas about technology integration in the classroom (Dinc, 2019). This study contributes to the field of education by adding information about current teacher perceptions of 1:1 technology instruction in classrooms at the early elementary level. As 1:1 classrooms and a focus of educational technology is changing education, an understanding of teachers' views of this change is necessary to fully

understand the potential outcomes this type of learning can provide (Gherardi, 2017). Understanding teachers' perceptions and experiences, including the strengths and challenges with 1:1 technology initiatives, may provide a lens of understanding and awareness for districts utilizing innovative 1:1 classrooms. The 1:1 initiatives at the elementary level will look different and require different approaches than those at the middle school or high school level (Frazier & Trekles, 2018; Magen-Nargar & Firstater, 2019). I sought to bring about positive social change by providing insights into the perceptions of early elementary teachers utilizing 1:1 technology in their classroom that may help support other teachers as they use an innovative 1:1 technology classroom to prepare early elementary students for 21st-century skills.

Summary

In this qualitative study, I sought to gain insight into the perceptions of early elementary teachers using 1:1 technology. In this chapter, I summarized research surrounding 1:1 technology initiatives. The literature shows that 1:1 technology initiatives and the use of technology in the classroom supports the need for effective technology use in the classroom; however, little is known about the perceptions of teachers at the early elementary level in regard to the strengths and challenges of using 1:1 technology to support pedagogy and content to influence student achievement in the classroom. This problem aligned with the purpose of the study and the intended research questions. I also explained the conceptual framework that guided this study. The TPACK framework was used as a foundation to examine how 1:1 technology is influencing how teachers utilize technology to support their teaching of pedagogy and content in the early

elementary classrooms. In this chapter, I also described the rationale for the chosen basic

qualitative approach for this study and why other approaches were not chosen. Then I

provided necessary definitions for key concepts necessary to this study. I explored any

assumptions this study is built upon. In the following sections, I described the scope of

the study, along with any delimitations and limitations associated with this study. Finally,

I ended this chapter with the significance this study may provide. In the following

chapter, I will explore in more depth the literature and research surrounding technology

use in the classroom, 21st-century learning, TPACK, and 1:1 initiatives.

Chapter 2: Literature Review

The implementation of 1:1 technology classroom initiatives has been increasing as school districts seek to make changes utilizing technology in education (Heath, 2017). In a 1:1 setting, each student has their own individual device, such as a Chromebook or iPad. The increasing access to technology in the personal daily lives of society is changing the way in which people communicate, interact, and complete tasks (Kurvinen et al., 2020). In Chapter 2, I review the search strategy used to find literature relating to this study. I describe the TPACK framework and explore how technology, pedagogy, and content must work together in the classroom (Koehler & Mishra, 2005). Early elementary pedagogy and teaching strategies are then discussed to examine how they may be influenced through the use of technology. I also examine the research on 21st-century learning and how this relates to technology use in the class, and I expand upon the integration of 21st-century learning into the curriculum and content at the early elementary level. Research on technology use in the classroom is discussed, including strengths and challenges teachers may face when utilizing technology in their classrooms. I then explore current research on 1:1 initiatives at the elementary and secondary level as well as research related to teacher technology self-efficacy and how this may influence technology use, followed by a discussion of how professional development can support this integration process. This chapter ends with insight into the COVID-19 pandemic and how this shift in learning impacted teachers and technology use in classrooms.

Literature Search Strategy

The information in this literature review was gathered from peer-reviewed journals and articles. I used a variety of databases to find research-based articles, including Education Source, ERIC Journals, ScienceDirect, and Academic Search Complete. The Google Scholar search engine was also used to find frequently cited articles and keywords. I used different combinations of keywords to find related research to this topic. To begin, I searched using the keywords *1:1 or one to one or one-to-one* and *technology or devices or Chromebooks or iPads* and *education or school or classroom.* This provided research on specific 1:1 initiatives. Then I used the combination *technology* and *education or school or classroom.* To find more specific research at the elementary level, I added *elementary or primary or 1st grade or 2nd grade or 3rd grade.* I also searched using the keyword *21st-century learning or 21st-century skills.* I wanted to also relate 21st-century learning specifically at the early elementary level, so I used to combination *21st-century skills and early elementary or kindergarten or first grade or second grade.* To find research on the strengths and challenges of technology use the following keywords were used: *technology* and *classroom or education or school* and *strengths or benefits or challenges or barriers.* I also tried *technology and early elementary or kindergarten or first grade or second grade and benefits or advantages or positive effects or importance or impact.* After using the search to find frequently cited articles and keywords, the search was filtered to include only peer-reviewed articles. I also used a combination of *pedagogy or teaching or teaching strategies or teaching methods and early elementary or kindergarten or first grade or second grade or learning*

styles to find research related to specific pedagogical views at the early elementary level.

Once the COVID-19 pandemic hit, I also began searching for peer-reviewed articles

related to how technology shifted during this pandemic. I used the search terms *COVID-*

19 or coronavirus and elementary or kindergarten or first grade or second grade or third

grade or 1st grade or 2nd grade or 3rd grade and virtual learning or remote learning or

online learning.

Conceptual Framework

In this section, I describe Koehler and Mishra's (2006) TPACK framework,

which builds upon Shulman's (1987) PCK framework that examines how teachers

develop lessons based on an understanding of content knowledge and pedagogical

knowledge (Shinas & Steckel, 2017). TPACK is a framework that serves as a guideline

for teachers to integrate technology into their teaching practices in an effective and

purposeful manner (Kul et al., 2019). The TPACK framework suggests that in order for

quality teaching and learning to occur, all three knowledge bases must be included and

working together (Nelson et al., 2009). The purpose of this study is to investigate how

Midwestern public school early elementary teachers perceive the strengths and challenges

of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century

skills. The TPACK framework served as a guide when analyzing the strengths and

challenges teachers are facing in a 1:1 classroom. In the following sections, I discuss the

different concepts of the TPACK framework and how it relates to this study.

According to Koehler et al. (2013), technology knowledge is hard to define

because it is constantly in a state of change; however, they describe technology

knowledge as an understanding of how technology can help accomplish varying tasks as they adapt to changes in technology. As new technology is developing and changing, teachers must continue to build their own understanding of the technology and when it is most appropriate to use different technologies for different tasks. Pedagogical knowledge refers to a teacher's understanding of different teaching methods and theories current in education. This consists of an understanding of classroom management and how students learn and develop skills (Koehler et al., 2013). Content knowledge is teachers' knowledge about the theories, frameworks, and concepts associated with the subject matter that is being taught (Koehler et al., 2013).

PCK is the basis of connecting learning, teaching, curriculum and pedagogy. This consists of teacher flexibility in utilizing different teaching strategies, understanding students' prior knowledge, and providing multiple means of learning a concept (Koehler et al., 2013; Schulman, 2013). PCK focuses on the interaction and connection of the five domains of learners, schools, subject matter, curriculum, and pedagogy (Niess, 2011). Knowledge of pedagogy and content are interwoven to provide appropriate and effective learning strategies with the learning of content. Technological content knowledge is the need for understanding not only how technology and content influence each other, but an understanding of how the content may be changed by the use of specific technologies (Koehler et al., 2013). Through an understanding of how technology and content may work together, teachers are able to choose the best technologies that students can use to enhance the learning of different content. Technological pedagogical knowledge is understanding how using specific technology in specific ways can influence teaching and

learning (Koehler et al., 2013). Utilizing technology in the classroom influences how the classroom environment is structured and influences the interactions of students with each other and the teacher. Experienced teachers who have developed their own existing pedagogical practices must develop new habits and interconnections between new technology and how this can exist in the classroom (Blau et al., 2016). A study done by Hur et al. (2016) indicated that having a knowledge of technology skills was not enough to ensure that teachers were using technology to effectively enhance student learning in the classroom without an understanding of pedagogy as well. Teachers must also have an understanding how different digital tools can make learning accessible for all students in different ways that make for meaningful learning experiences (Shinas & Steckel, 2017).

TPACK is the understanding of pedagogical approaches that incorporate appropriate technology to teach content (Getenet et al., 2016; Voogt & McKenney, 2017). TPACK examines how digital tools can be used to support instructional techniques and present content in different ways (Ronan, 2018). Technology should not be viewed as a separate unit but should be used to shape the knowledge of content and pedagogy (Ozdemir, 2016). As new technology is developed, teachers will develop their technological knowledge and then incorporate this into their pedagogical and content knowledge so the three may work together (Blau et al., 2014). Gherardi (2017) conducted a study to examine teachers sensemaking of 1:1 initiatives and found that the teachers' beliefs in how and what students should learn strongly connect to their views of 1:1 learning. When technology is used to merely replace a physical textbook, learning is not

improved. A shift in pedagogy is necessary to effectively incorporate digital tools into the classroom (Lawrence et al., 2018).

The ISTE standards support the TPACK framework as they include development of technological skills, effective technology use to present content, and technology use for instructional learning (Ronan, 2018). Nelson et al. (2019) found a direct relationship between TPACK and ISTE technology standards: as teachers worked to align ISTE standards into their curriculum, they developed a stronger sense of technology content pedagogy; in the opposite regard, teachers who had a low level of technology knowledge were less likely to incorporate ISTE standards into their lessons. Nelson et al. also found that preservice teachers developed a stronger sense of technology knowledge and TPACK, influencing the implementation of ISTE standards, when they felt supported by the school they were attending. TPACK served as a framework in this study to analyze how the elements of pedagogy and curriculum in an early elementary classroom are influenced with the use of 1:1 technology in the classroom.

Early Elementary Pedagogy and Teaching Strategies

There has been an increase at the early elementary level not only in technology use, but in the pedagogical and curricular practices as well (Danniels et al., 2020). Technology use at the early elementary level should be used purposefully to support student learning; however, it does not mean that other sensory and hands-on experiences should not occur as well (Ihmeideh & Al-Maadadi, 2018). Current pedagogy practices at the early elementary level incorporate play-based activities, and teachers need to determine ways to incorporate their instruction, play-based activities, and technology-

based tools together (Danniels et al., 2020). In order to do this, teachers must gain an understanding of the best practices and strategies to incorporate with their current strategies and pedagogy in the classroom. According to Ihmeideh and Al-Maadadi (2018) kindergarten teachers struggle to integrate technology tools into the classroom because of their own lack of technology knowledge and lack of knowledge on strategies and best practices for utilizing technology with students at the early elementary age. Ihmeideh and Al-Maadadi found that teachers changed their views about integrating technology into their classrooms after receiving appropriate and effective ICT training that offered strategies and benefits of utilizing technology with early learners. These teachers were more likely to change their practices and incorporate technology into their pedagogical beliefs if they could see the benefits and importance in using technology. In a study by Urbina and Polly (2017), teachers in a 1:1 technology elementary classroom expressed that technology use is an important skill for students; however, technology applications were typically low-level applications for students that finished classwork early. This study found that although elementary teachers may feel technology use is beneficial, they need more support in developing understanding of how to incorporate it into the classroom to support their content and pedagogy. Strawhacker et al. (2018) found that how kindergarten teachers responded to challenges they faced in regard to technology use with students was influenced by their own pedagogical beliefs and teaching strategies. It is also important that teacher education programs prepare preservice teachers with how to integrate technology into their current pedagogies in ways that can transform learning (Mitchell, 2019).

Building student accountability and responsibility in their learning is an important shift in 21st-century learning and pedagogy. At the early elementary level, the use of technology allows teachers to meet students' multimodal learning strategies that best meet the individualized needs of each student (Yelland, 2018). This also allows students to take more accountability in the learning process. In a study by Yelland (2018) of kindergarten through second grade students utilizing iPads to support literacy skills, he found that students gained more autonomy and control in their learning as their progress and growth became more transparent to students and parents with the use of the iPads.

According to Hallman (2019), the pedagogy of personalized learning, which focuses on each individual student's needs, is most associated with 1:1 initiatives as teachers integrate technology into the learning environment. Hallman suggested that 1:1 initiatives create a shift in instructional practices as well as pedagogical beliefs. Similarly, Parrish and Sadera (2020) expressed that 1:1 initiatives can be beneficial for students if student-centered learning is incorporated into the teachers' pedagogy and they develop an understanding of how to effectively and appropriately implement technology into their instruction. The researchers of study found that teachers who were able to effectively integrate 1:1 technology into the classroom did not view technology and pedagogy as separate entities and technology would be integrated into the learning process. Their study also found that 1:1 technology classroom environments require teachers to restructure and rethink what classroom management may look like and what best strategies to utilize to support and manage students as they individually utilize technology devices. Woloshyn et al. (2018) also found that the implementation of iPad use in a first

grade classroom was rooted in the pedagogical practices of inquiry-based student-centered learning to support 21st-century learning skills. In a study by An and Mindrilla (2020), teachers who expressed a learner-centered pedagogy incorporated many different strategies and technology tools to build student independence, collaboration, and authentic real-world experiences. Teachers in this study also found that teachers utilized different technology applications that allowed students to work at their own pace and meet their own specific needs while getting instant feedback.

The parent perspective on technology use at the early elementary age is also relevant. Erdogan et al. (2018) examined parents' views on digital play or the use of technology for play in the classroom. They found that parents expressed both advantages and disadvantages of digital play. Parents recognized the potential learning opportunities, both in educational skills and technological skills; however, they felt that it is necessary to balance this with physical activity and the amount of time digital tools are utilized should be monitored.

<div align="center">**21st-Century Learning**</div>

Teaching in the 21st-century aims to develop citizens who can question, think, produce, criticize, and develop solutions (Onur &Kozikoglu, 2020). According to the Office of Educational Technology (2017), schools must incorporate 21st-century learning skills into the classrooms in order to continue to be globally competitive and help students develop into informed and engaged citizens. Schools today have a duty to prepare students with 21st-century skills (Gocen et al., 2020; Parrish & Sadera, 2020). It is necessary to prepare K-12 students for digital use and information fluency as the use of

mobile technology is becoming a norm in today's society (Luo & Murray, 2018). In the 21st-century, there is a necessary shift in education from memorizing information to developing necessary skills that people face in everyday life and in the workplace (Bektas et al., 2019). Today's students must acquire the necessary skills of collaboration, communication, creativity, digital literacy and self-directed learning – known as 21st-century skills. Many school districts across the United States are setting educational goals to promote these 21st-century skills (Varier et al., 2017), and schools are developing innovative approaches to shift classroom environments to a more student-centered pedagogical design (Gocen et al., 2020). Schools are tasked with helping students develop the skills needed to be successful in the 21st-century and preparing students for jobs in the future that may not even exist today (Morrison, 2019).

As information in the world is constantly changing and evolving, it is necessary for students to "learn how to learn" to prepare them with the skills to adapt, process new information, and determine potential ways to respond in new environments (Ilie, 2020). Learning 21st-century skills in the classroom prepares students to become critical thinkers that are able to communicate, think creatively and problem solve (Onur & Kozikoglu, 2020), and these skills are believed to be more important for students to learn than memorizing facts (Yelland, 2018). In order to ensure that students develop the necessary 21st-century skills, schools must shift from focusing on the basic literacy skills and start incorporating the 21st-century skills into core curriculum (Anagun, 2018). A positive correlation has been found between students with high technology competency and 21st-century skills (Onur & Kozikoglu, 2020). In today's classroom, using

technology is no longer a choice, but a requirement as technology becomes interwoven with curriculum to allow students to opportunity to learn with technology, as opposed to learning about technology (Zhong, 2017).

It is a goal of the global education reform movement to prepare students to be digital learners and independent thinkers that are able to compete in a technology-driven world (Anagun, 2018); however, not all teachers have an understanding of how to do this effectively. According to Trust (2017), there is a divide in learning for students in schools that utilize computers for lower-level games and video use compared to classrooms that utilize technology to build 21st-century skills. O'Neal et al. (2017) found that teachers do not have a strong understanding and training of 21st-century skills and how this relates to technology use in the classroom. In a study on TPACK in relation to 21st-century teaching, Chai et al. (2019) concluded that teachers must transform their beliefs in lesson design in order to determine how different technology tools can be used in the most effective ways to promote 21st-century learning. They recognize that this is something that institutions need to focus on to begin to transform the pedagogical beliefs teachers currently hold in regard to technology and 21st-century learning in the classroom. 1:1 initiatives are considered a way to prepare students with the necessary 21st-century skills as they learn about new technologies and prepare for developing and evolving real world (Hallman, 2019).

21st-Century Curriculum at the Early Elementary Level

A primary focus of learning at the early elementary level is developing the ability to read. There are many different theories, strategies, and approaches for developing the

reading process for early readers (Koorneef et al., 2019). According to Koorneef et al. (2019) reading texts and stories in paper format is no longer the norm in this digital age. Koorneef et al.'s (2019) study on digital texts suggests that texts in digital form offer many different layouts and approaches to reading that can benefit beginning readers develop their reading skills. Being able to utilize different digital tools and apply to different contexts and skills is a vital part of helping 21st-century students become multiliterate (Yelland, 2018). With technology coaching support, kindergarten teachers in a study done by Hilaire and Gallagher (2020) were able to support student growth in reading through the implementation of technology tools. Sabiril and Coklar (2020) found that elementary students were more motivated in English classes when the implementation of an educational digital game was used. These students also showed significant academic growth compared to the control group not utilizing the digital game. Voogt and McKinney (2018) found that teacher education institutes are not training pre-service teachers to develop their own TPACK in regard to early literacy. They found the focus to be on using e-books and not developing an understanding of how technology can be used to support young students in literacy. Teacher candidates in university literacy classes expressed that they felt more confident in the ability to use technology; however, their focus in university classes was not on the instructional purpose of technology use to support literacy in the classroom (Meyers et al., 2019).

As elementary students enter into third grade and reading comprehension becomes a stronger focus, it is important for students to develop an understanding of vocabulary including vocabulary associated with comprehension instruction (Fogarty et al., 2020). In

their study, Fogarty et al. (2020) utilized a technology app to provide vocabulary intervention that would help students build upon necessary vocabulary for comprehension. Teachers in the study found that the technology app was effective and easy to implement; however, they needed support in determining the best ways to incorporate technology related vocabulary interventions into their classroom instruction times.

Another important learning milestone in the early elementary classrooms is the ability to write. Bonneton-Botte et al. (2020) conducted a study examining the use of tablets to support kindergarteners learning handwriting skills. They found that utilizing a tablet with a stylus and a specific handwriting app offered one-to-one instruction and benefited students in developing their motor learning skills for handwriting.

As young students develop their math skills, manipulatives are used to support students understanding of numbers through hands-on learning. The use of virtual manipulates, such as technology apps, can provide expanded opportunities for students to explore and build their conceptual understanding (Litser et al., 2019). In a study of primary students utilizing a specific math manipulatives app, Litser et al. (2019) found that the features of the app allow the students to engage in reflective learning and self-correction and make connections in their learning of math skills; however, it is important for the teacher to help students understand how to use the technology application to ensure they are partaking in those practices. The researchers also found that when utilizing different technology applications for math it is important for teachers to be aware of different students' levels of learning and achievement in regard to the subject

material and technology skills to ensure it is appropriate for the student (Litser et al., 2019).

The use of technology math applications may provide opportunities to support math content in the classroom. Christopoulos et al. (2020) conducted a controlled study of a technology-based math program in a third grade class and found that students utilizing the application made improvements in math. The addition of an educational technology program into their current math curriculum increased student motivation and increased students' sense of self-efficacy as they were involved more in their learning process. This also allowed teachers the ability to differentiate for individual student needs and learning types, while providing necessary interventions based on student progress. Urbina and Polly (2017) found that elementary teachers in math utilized technology for more whole group teaching practices, such as an interactive whiteboards and doc cameras. Math technology applications were used more often for early finishers to continuing practicing basic math skills. Teachers must choose the appropriate and most beneficial tools to incorporate into their lessons to benefit their student learning. Kurvinen et al. (2020) did a long-term study on students utilizing a math computer program and found that students made significant growth in their math skills. As students were provided with instant feedback, they were able to learn from their mistakes and were more motivated in the learning process.

In early education, curriculum and pedagogy is focused on play-based learning to support academic and developmental growth (Danniels et al., 2020). In a study by Danniels et al. (2020), kindergarten teachers were able to integrate technology as a means

of assessment of play-based learning in their classrooms and overall the teachers

expressed this was beneficial and supportive to this process. Strawhacker et al. (2018)

also found that kindergarten teachers found the use of specific computer programming

tools helped their students explore and problem solve through inquiry-based learning.

Digital game-based learning has also been found to benefit young non-native speaking

students and develop English literacy skills as it meets different learner styles and

motivates young children through a game-like approach (Zulkiply & Aziz, 2019).

Yelland (2018) found that 21st-century learning does not just mean that students are

using digital tools or devices, but they are determining which tools work best for them as

a learner and for the skill they are learning.

Technology in the Classroom

Technology is constantly evolving and is becoming increasingly prevalent in

homes and used in day-to-day living (Johnson, 2020). Technology has provided many

advancements and changes in many aspects of our daily lives, including education (Dinc,

2019). As students' exposure to technology in their personal lives increases, the need to

incorporate this technology into the classroom increases as well (Sabiril & Coklar, 2020).

Classrooms today consist of students that are "digital natives" and are more inclined to

utilize technology and multimedia tools for learning (Zulkiply & Aziz, 2019). As the use

of digital devices changes how people communicate, interact, and work, it is important

for schools to teach students how to appropriately and effectively accomplish this

(Kurvinen et al., 2020). Utilizing technology in the classroom can lead to increased

student motivation and performance, and also allow opportunities to differentiate learning

for students (Hoffman & Ramirez, 2018). Technology in the classroom provides innovative opportunities for teachers to incorporate into their lessons (Hull & Duch, 2019).

As the requirement for technology use in the classroom has increased, the need for teachers to integrate technology effectively and purposefully into their instruction as a means of learning for students has increased as well (Ozdemir, 2016; Zipke, 2018). Although a classroom may be utilizing technology frequently, this does not always correlate to an increase in student learning (Lawrence et al., 2018). Shinas and Steckel (2017) noted that having the most advanced technology does not imply that a teacher is effectively implementing technology in the classroom; rather it is how teachers are utilizing the digital tools they do have available to meet the curricular goals and learning outcomes that meet the needs of the students. Effective teachers must consider the "what" and the "how" first, in order to determine what digital tools can best help meet those goals.

The use of technology in a classroom does not automatically mean that it will be successful in motivating students and improving learning (Mitchell, 2019). Technology use in the classroom must be purposeful and meaningful in order to be effective in the classroom. In a study done by O'Neal et al. (2017), they found that teachers are using technology in the classroom as a separate activity rather than incorporating technology use in curriculum to support 21st-century learning. When technology is used effectively, it can enhance student learning and allow students to think and create in different ways (Mitchell, 2019). According to Taladriz (2019) technology should be used in the

classroom to build relationships and interactions between students and teachers and focus on the emotions involved in the learning process. In a study done by Coklar and Yurdakul (2017), they found that teachers started using technology in their classrooms to improve retention, provide visuals and examples, and increase engagement.

Teachers face the challenge of balancing increased workloads along with adjusting and evolving to new technology initiatives and changes (Johnson, 2020). A goal of educational technology is to help improve student learning and academics, but it is also to increase students' computer and technology skills (Hull & Duch, 2019). The ISTE standards were created to provide guidelines of technology skills to be incorporated in the classroom. The ISTE standards were redefined in 2017 to build upon the 2008 technology standards to incorporate skills such as collaboration, digital literacy, computational thinking, and student empowerment to incorporate the growing changes that have occurred though the use of technology and social media (Trust, 2018).

Potential Strengths

Utilizing technology in the classroom has the potential to offer several benefits. Several studies have found an increase in student motivation and engagement through the use of technology in the classroom (Harris et al., 2016; Lou & Murray, 2018.) In a study by Kim et al. (2019) teachers expressed that they found the use of devices in a 1:1 technology classroom provided opportunities for increased instructional, student-centered activities that are motivating for students and allow for increased communication and exploration. The use of technology allows teachers to develop a more student-centered classroom environment. Through the use of different technology programs or

applications, teachers can individualize the learning tasks for students to meet different needs and learning styles of students (An &Mindrilla, 2020). Hull and Duch (2019) found that with the implementation of 1:1 technology in the classroom, there was a decrease in student absences. Christopoulous et al. (2020) also found that students were more motivated with the use of curriculum-based technology applications as it allowed the students to be a part of their learning process and they were able to see their own progress, while receiving instant feedback. Chen et al. (2018) found that students were not only more motivated and engaged in their learning but also made significant academic gains through the incorporation of technology into their math intervention program. Similarly, a study by Sbiril and Coklar (2020) found that the addition of a digital game into an English class lead to increased motivation and academic gains.

The use of technology in the classroom provides innovative opportunities for teaching and learning that can help students develop 21st-century problem solving skills (Ilie, 2020). Educational technology programs provide teachers with the opportunity to differentiate lessons and activities to be able to challenge advanced students and provide more help for students that may be struggling with a concept (Hull & Duch, 2019). Curriculum based technology programs also allow teachers to easily track the progress of students so they can quickly see which students may be in need of extra support and provide feedback and intervention (Christopoulos et al., 2020).

Children today utilize technology to connect with others on a daily basis in their personal lives but are not always experiencing the same type of connection through technology in the classroom (Hoffman & Ramirez, 2018). As children of all ages are

being more and more occupied with using technology in their daily lives, changes in

innovative technology are being developed to allow for learning to occur in fast, fun, and

simple ways that are motivating and engaging to students (Luo & Murray, 2018;

Stanisavljevic et al., 2016). The use of technology can provide real-life training and

experiences by combining online learning and face-to-face learning with differentiated

learning specific for each student's learning goals and learning styles (Condruz-Bacescu,

2020). Hoffman and Ramirez (2018) conducted a study to look at students' perspectives

of technology use in the classroom and found that students express they are confident in

using technology for connecting with others and for accessing information and learning

in the classroom. Students also expressed that they felt that the use of technology in the

classroom provides them more opportunities to be successful in the classroom and in

their lives. Similarly, elementary students in a study by Neokleous (2019) expressed that

the use of technology allowed them to collaborate more with classmates and with

students in other parts of the country. They also felt they were more engaged and active

in the learning process as technology allowed them to be more independent and

responsible for their learning while being able to focus on things that interest them.

  According to Condruz-Bacescu (2020), teachers expressed that they believe

technology use in the classroom offers opportunities for communication, searching for

information, and learning new knowledge. Technology also offers the potential to

provide equitable opportunities for students to have access to the necessary accessibility

features they may need to be successful (Dinc, 2019). This is vital for students that do not

have access to internet or technology at home and provides them equal opportunity to

learn these technology skills that will help them in the workforce (Hull & Duch, 2019).

Ronan (2018) discussed how effective technology use can support and benefit english

learners by utilizing interpretive options that allow students to listen or write in different

languages while interacting and collaborating with their peers. With technology, students

can provide different means of showing their learning; therefore, changing how

assessment may look in the classroom (Kaden, 2020).

Potential Challenges

Although teachers may see the importance and benefits of technology integration

in the classroom, they may not have the necessary skills, training, or confidence to

effectively incorporate technology into their teaching (Kwon et al., 2019). As school

districts attempt to incorporate more technology into the classrooms, a lack of funding

may be an issue when trying to provide devices for students and have the appropriate

interface and hardware to support the use of technology while providing necessary

training to teachers (Johnson, 2020). Lack of resources, and professional development,

along with poor planning and a lack of leadership ability can all serve as barriers to

successful 1:1 technology implementations and technology use in the classroom (Cole &

Sauers, 2018). There may be benefits to the use of 1:1 technology devices in the

classroom, but if not used and managed properly there may be several challenges and

setbacks to the learning environment (Luo & Murray, 2018). If not used effectively,

students may be bored or unmotivated by the technology. In an elementary study of a 1:1

technology classroom, Urbina and Polly (2017) found that the district expected students

to utilize a specific math technology program for a certain amount of time. The teachers

expressed that students did not like this program as they utilized the technology program frequently and felt it was a low-level technology application.

Technology use in the classroom has the potential to benefit students; however, it may also serve as a distraction to students as they utilize devices for games or social media instead of for learning (Hull & Duch, 2019). Francom (2019) studied teacher perceptions of barriers when using technology and found that time was the most significant barrier, and training and technical support were the second highest rated barrier. Several studies of 1:1 technology classrooms have found teachers expressing frustrations or beliefs that students are more likely to be distracted by the use of technology or misuse their devices (Frazier & Trekles, 2018; Holen et al., 2017). According to Condruz-Bacescu (2020), teachers also expressed that technology use in the classroom creates an addiction, limits communication and exposes students to potential cyberbullying experiences.

Another barrier teachers face when integrating technology in the classroom is a lack of support to help when there are technology-related issues or glitches (Liu et al., 2017). When teachers who may not be feeling as comfortable using technology experience technical issues that they do not know how to resolve they can very quickly be discouraged from integrating technology. A common frustration expressed by teachers is the loss or lack of time due to troubleshooting, technical issues, or having to teach students how to use the technology (Alexeni, 2017; Dinc, 2019); however, teachers in a study by Alexeni (2017) who were more confident in their technology integration viewed this barrier differently. These teachers did not express concern for time lost due to

technical technology issues, but some expressed that when this happened it actually motivated students to want to solve the problem and help the teacher.

Another important challenge to note is barriers parents may face in navigating this shift to technology. In a study by Kim and Padilla (2020), parents expressed frustration in trying to navigate the learning platforms to help their child at home. This was an even larger struggle for parents that are not proficient in English. The authors found that although the school district provided devices to all students, there are still barriers in supporting non-English speaking families. Kim and Padilla (2020) also noted the economic barriers that low-income families face in attaining the necessary Internet access for students to be able to complete any of their online work.

1:1 Technology Initiatives

A 1:1 technology initiative or program is when every student in the class, school, or district are provided with a device, such as a laptop or tablet, to utilize during the school day or while at home (Hull & Duch, 2019). Typically, in these types of initiatives, families are required to purchase or lease the chosen device, such as an iPad or Chromebook, and some schools utilize a "bring your own device" system. The goal of this initiative is for each student to have a personal device to support learning in the classroom (Selwyn et al., 2017). At the secondary level, 1:1 technology programs have become a common practice and are becoming increasingly more common at the elementary level (Cochrane, 2020). Such technology initiatives have been implemented in at least 42 countries due to an increase in concern over students having an unequal access to technology (Yanguas, 2020). Improvements in tablet technologies, such as the

ability to easily carry around these lightweight devices, have made learning 21st-century skills more accessible as the use of different types of tablets or hybrid laptops becomes more a common daily use for all people (Varier et al., 2017). The implementation of new academic standards such as Common Core State Standards, English Development Standards, and Next Generation Science Standards increased expectations of academic rigor, but also increased expectations for technology integration to support students in the use of 21st-century tools. This increase in technology use expectations has resulted in more school districts beginning to implement a 1:1 technology classroom environment (Ronan, 2018); however, since the 2020 COVID-19 pandemic many districts that had not already gone 1:1 with technology were forced to provide some type of learning device for every student as schools were forced to shift to an online learning environment (Morgan, 2020).

A goal of 1:1 technology initiatives in the United States is to continue to support students in gaining technological skills necessary in the workforce to sustain national confidence, security, and economic competitiveness (Holen et al., 2017). With 1:1 technology devices, there is more opportunity for collaborative learning shifting classrooms into more student-centered environments (Varier et al., 2017). In a 1:1 technology classroom, individual devices serve as an opportunity for educators to develop student-centered, differentiated activities that can meet the needs of different learners (Aitken, 2017). In this type of classroom environment, the role of the teacher changes as they are no longer the one providing knowledge and are now more of a facilitator in guiding students to acquire knowledge through discovery with the use of

technology (Hallman, 2019). One of the main reasons expressed by superintendents for initiating 1:1 technology programs is to not only change how students are learning in the classroom but to also change how teachers are teaching as they prepare students to be successful in a technology-driven workforce (Cole & Sauers, 2018).

The implementation of 1:1 technology initiatives comes with more costs and expenses than other technology implementation programs; however, they provide more of an opportunity for improvements and positive outcomes (Hull & Duch, 2019) and superintendents believe that the potential benefits outweigh the costs (Cole and Sauers, 2018). In 1:1 technology initiatives, stakeholders must decide the type of device that will be used to provide each student with a device that is affordable and easy for student use. In one study, Vu et al. (2019) found that 10 out of 15 schools chose Chromebooks as their 1:1 initiative device. They also noted that elementary schools preferred iPads as their 1:1 device, and secondary preferred Chromebooks; however, just because students in a classroom may each have their own device does not imply that students will benefit from the use of technology. A study of a 1:1 technology program in Uruguay found that students having individual personal devices did not produce an impact in students learning. The researchers concluded that having devices does not improve learning without teacher training and improvements in the educational usage of technology devices (Yanguas, 2020). The success of a 1:1 technology implementation is influenced by the teacher's ability to incorporate technology effectively in the classroom and provide opportunities for student growth through student-led exploration and activities (Lawrence et al., 2017). A study done by Lawrence et al. (2018) found that classrooms with higher

digital use actually had negative impacts on student learning. The quality of technology use is more important than the amount of time or frequency of use. Chen et al. (2018) stated that educators need to think beyond what specific technology tool they will use but instead think about how they will approach the entire learning experience regardless of what tool is used. Technology should be integrated into classrooms as a way to enhance and redefine the learning experience and provide opportunities that encourage students to think, explore and create at levels that would not have been able to be achieved elsewise (Mitchell, 2019).

An important element of a 1:1 technology program, that became very prevalent during the COVID-19 pandemic, is to ensure students are able to utilize the devices at home as well. In a study by Kim and Padilla (2020), both students and parents expressed the importance of technology use in their academics and shared that having access to a digital device was necessary in order to complete their work. According to Cochrane (2020) by ensuring students can utilize and access technology at home as well as at school, students will be more likely to make academic gains and reduce the digital divide found amongst students that typically do not have access to technology at home.

The implementation of 1:1 technology initiatives has the potential to provide positive impacts on student achievement. Hull and Duch (2019) stated that it may take a few years after transitioning to really see the effects. In a study following a district's 1:1 technology pilot experience, Peterson and Scharber (2017) found that an important element of a 1:1 technology initiative is to first discuss and focus on the learning vision and how pedagogical and curriculum goals will be impacted or influenced with the

technology, as opposed to focusing only on the technology element. As schools move forward following the COVID-19 pandemic, schools and districts around the world have and will need to continue to consider how students are individually accessing and using digital devices and technology (Cochrane, 2020).

Elementary Level

The implementation of 1:1 technology initiatives at the elementary level are increasing. Frazier and Trekles (2018) note that the same approaches being used at the middle school and high school level are not as effective or appropriate at the elementary level. In the elementary classroom, teachers must balance developmentally appropriate hands-on, play-based activities with technology-related activities as well (Danniels et al., 2020). Teaching students the necessary social skills is a strong component of the early elementary classroom. Early elementary teachers may be hesitant or reluctant to utilizing technology in the classroom because they lack the knowledge and training on pedagogy and strategies to incorporate technology effectively to support the development of students at the early age (Ihmeideh & Al-Maadadi, 2018). Children at the elementary age need to develop an understanding of digital citizenship and available technology in the 21st-century (Johnston et al., 2018). In a study by Francom and Moon (2018), teacher candidates attending university classes would partake in elementary classes that utilize 1:1 technology for learning to provide teacher candidates with a real-life experience of this type of initiative. They found that this increased the teacher candidates' self-efficacy of technology use but also increased the knowledge and confidence of the elementary classroom teachers as well. The classroom teachers felt having more adult support was

helpful in a 1:1 technology environment but also found it helpful to gain ideas from teacher candidates and professors at the university about current technology implementation strategies.

Early elementary 1:1 technology initiatives may look different as technology use at the kindergarten level may require lower-level applications compared to upper grades as kindergarten students primarily learn through auditory and visual as they are still developing their reading and writing skills (Magen-Nargar & Firstater, 2019). In a study done by Magen-Nargar and Firstater (2019), teachers found that using computers in a kindergarten classroom created an opportunity for students to cooperate as they helped each other problem solve when they ran into challenges or questions when using technology. However, teachers also expressed that they believe kindergarten is a time for students to develop their social and communication skills through play and hands-on experiences that they feel is not found as easily through the use of technology. Elementary teachers in a study by Urbina and Polly (2017) felt that the implementation of a 1:1 Chromebook program created a district expectation that students and teachers should be utilizing technology all the time for teaching and learning, although it may not serve as the best tool for the purpose of the lesson. The researchers in this study found that more support and training is needed at the early elementary level to help teachers incorporate technology to support their curriculum and their pedagogy.

Secondary Level

Luo and Murray (2018) conducted a study examining the teacher's attitudes about a 1:1 technology initiative at the middle school level and found that teachers felt having

these devices in the classroom could be beneficial, but they also felt there were many drawbacks and that students were not capable of using these devices as means to foster self-direction and independence. A study of a 1:1 iPad initiative in a middle school STEM program found that the use of technology provided students with multiple means of demonstrating their learning and found students' means of communicating their results was enhanced through different means of technology (Henderson-Rosser & Sauers, 2017). Bixler (2019) found that having 1:1 iPads at the middle school level did not positively influence academic achievement in math and science; however, teachers and students expressed that is positively impacted learning opportunities for students to collaborate, communicate, and differentiate in the classroom.

Holen et al. (2017) researched the different elements that were successful and challenging in a 1:1 technology initiative at the high school level. Their study found that there was a shift in the roles of teacher and student in the classroom. The teacher became more a facilitator in the learning process and activities became more student-centered, even if teachers were reluctant to this change. Their study also found students became active knowledge seekers in a 1:1 technology environment as they were able to very quickly find answers to questions; however, this also led to a need for instant access and gratification and limited the students from seeking a deeper level of understanding and application. A longitudinal 4-year study (Curry et al., 2019) was done to examine the roll out of a 1:1 iPad initiative at the high school level. In this study, they found that students expressed frustrations with the lack of consistency amongst teachers use of iPads in the classroom. Students found that the iPads made completing work and projects more

efficient but they recognized the distractions it could also cause if teachers lacked classroom management and clear expectations. This study also found that teachers that may have been more reluctant to this shift in the beginning, easily resorted back to their old teaching ways by the end of the 4-year study, but teachers that expressed enthusiasm for the iPad initiative began making effective instructional changes with technology over the 4 years.

Byers et al. (2018) conducted a study to examine how the layout and spatial design of a 1:1 technology high school classroom impacted the benefits of technology use. They found different classroom layouts influenced the students' perceptions of how effective the technology was. These findings suggest using technology in a 1:1 technology classroom can be ineffective without considering how technology can be utilized for pedagogical purposes first. Selwyn et al. (2017) found that the use of 1:1 devices in the middle schools seemed to be used more to accomplish procedural tasks needed in school, such as to complete and hand in school work, and did not focus as much on the learning capabilities the devices could offer. The researchers also found that many of the teachers in the study would assign the same type of lesson or activity for all students to complete on their devices and remained more teacher-centered as they felt this would help limit any distractions or discipline issues.

Teacher Technology Efficacy

As teachers' workload has increased and new technology initiatives and changes are being introduced to schools, teachers may initially feel reluctant or frustrated with the idea of using technology (Johnson, 2020). However, teachers are more motivated and

likely to accept these changes when they feel confident in their own abilities and they feel

included in the decisions being made (Summers, 2020). Woloshyn et al. (2017) found

that the use of technology in a first grade classroom increased throughout the year as the

students and the teacher became more comfortable and confident using the device and

being able to problem solve or troubleshoot as problems arise. A study conducted by

Heath (2017) found that teachers that were able to implement technology use effectively

in the classroom also exhibited a positive belief about technology. These teachers were

also more capable of overcoming potential barriers in relation to technology. Teachers in

a study by Kundu et al. (2020) also expressed a positive correlation between teachers that

have higher ICT (information communication technologies) self-efficacy and positive

ICT infrastructure. Gherardi's (2017) study of a 1:1 technology initiative in a K-12

district found similar results. Teachers that exhibited a fixed mindset in regard to

technology use struggled to see any positive influences in the use of 1:1 technology

devices; however, teachers that had a more flexible mindset were able to see ways this

could improve how students learn.

Although teachers may believe that technology integration may benefit student

learning, teachers may still be more reluctant to integrating technology in the classroom

when they do not feel confident in their own technology abilities (Kwon et al., 2019).

Alenezi (2017) examined teachers who were considered as exemplars at technology

integration and teachers who were considered not as strong in this area. Teachers who

were exemplar all exhibited a strong sense of technology self-efficacy that related to their

comfortability in taking new risks with technology use, but the typical teachers in this

study expressed concerns and fears of students knowing more about the technology then the teacher and not knowing how to troubleshoot if something went wrong. Ihmeideh and Al-Maadadi (2018) found that teachers who received appropriate training to increase their own technology knowledge and implementation strategies changed their own pedagogical views as their self-efficacy increased.

Teacher Technology Professional Development

As the use of technology in the classroom continues to increase, especially with the implementation of 1:1 technology classrooms, the need for teacher training and professional development on utilizing these devices effectively with students is necessary. Not only is there a need for professional development in a 1:1 technology initiative, but there is also a need for an ongoing collaborative, supportive environment to continue to help teachers gain confidence in utilizing new technologies in their classroom (Frazier & Trekles, 2018). Professional development needs to be provided that allows opportunities for teachers to build their own skills and understanding of using technology. By building teachers' confidence in technology use, teachers' belief in the value of technology may be impacted which influences the amount of technology integration in the classroom (Heath, 2017). Research has also been found that professional development needs to go beyond just teaching the technology skills and focus on the relationship between content, technology, and pedagogy (Koehler et al., 2007). Walsh and Farren (2018) conducted a study with teachers using iPads in the classroom and they found that teachers expressed the main barrier they faced was a lack of professional development, specifically in how to connect utilizing technology with

teaching content and pedagogy. Ihmeideh and Al-Maadadi (2018) reiterated these findings in their study concluding that professional development should increase teachers' knowledge and understanding of the importance and benefits of technology use in the classroom, especially in the early grades. Teachers do not always have an understanding of how technology can be integrated into their teaching practices and require training on how to effectively utilize technology to transform learning (Peterson & Scharber, 2017). In a study of teachers' perceptions on professional development (Morrison, 2019), teachers expressed that the most valuable training they received was when the focus was on how technology can be incorporated into the classroom to support content and pedagogy.

Gherardi's (2017) study of a K-12 1:1 technology initiative found that in schools where leadership expressed a positive view of 1:1 learning and modeled a flexible mindset made it easier for teachers to take on a similar view. In contrast, in buildings that required mandatory use of 1:1 devices in order to be compliant, teachers were less likely to express a flexible mindset. As teachers adapt to 1:1 initiatives and technology use in the classroom, they will move slowly through the adoption process and into effective application to learning in the classroom (Kim et al., 2019). Teachers need to be provided the opportunity to take risks using technology (Heath, 2017) to continue to build their confidence and flexible mindset. When implementing 1:1 technology initiatives, district administrators need to take into count the current beliefs teachers have about technology and the realities of a teacher's daily life within the classroom (Heath, 2017) to provide proper training and support to ensure technology is used effectively in the classroom.

It is necessary to understand what skills are needed for teachers in a 1:1 technology environment in order to appropriately prepare teacher candidates for the classroom after completion of their undergraduate program (Parrish & Sadera, 2020). It may be perceived that new teacher candidates will be more comfortable using technology because they have grown up in the digital era, but this does not mean they have the training and knowledge to incorporate technology effectively into the classroom (Zipke, 2018). Teacher training and knowledge of using technology in the classroom for student learning needs to be built into undergraduate and postgraduate teaching training programs (Felix et al., 2018). Teacher educator programs have a professional responsibility to teach and prepare future educators how to effectively incorporate 21st-century learning skills and technology into meaningful and purposeful lessons in the classroom (Mitchell, 2019). The ability to understand and utilize technology is vital in today's 21st-century classrooms; however, many teacher preparation programs and professional development lack adequate training for teachers to effectively and efficiently utilize technology in their classrooms (Grundmeyer & Peters, 2016; Mitchell, 2019). In a study of preservice teachers' view of 1:1 technology, preservice teachers expressed a limited lack of knowledge on technology to support learning due to the teacher education programs lack of challenging and innovating technology curriculum (McCarr & Gallchoir, 2020). Most institutions are teaching technology as a separate class instead of allowing students to connect technology in the content courses (Coklar & Yurdakul, 2017). Kimm et al. (2020) found that preservice teachers demonstrated some knowledge of technology; however, they were not at a proficient level to effectively implement technology in the

classroom. Voogt and McKenney (2017) found that teacher education institutions in their study all expressed that technology is important and should be utilized; however, they do not provide enough training or instruction for pre-service teachers on how or what technology can be used to support students in early literacy. Pre-service teachers also felt that their teacher education program focused more on specific purchased programs or technology-based curriculum that utilized very low levels of technology integration that were not meaningful to the student learning experience (Mitchell, 2019). Teacher education programs need to prepare teachers with the skillset to effectively use technology for learning in the classroom to prepare students for future jobs.

Professional development and teacher support can and should continue to be provided as teachers navigate how to utilize technology for learning in their classrooms. Hilarie and Gallagher (2020) found that teachers had a more positive response when they were supported individually by coaches throughout an implementation process as this allowed for the coach to differentiate to their own needs just as teachers are expected to differentiate for students. They also found that a continuous coaching support system allowed for a coach to provide specific needed support and training as certain common issues would arise and support teachers one on one in the lesson planning elements. Even if teachers feel confident in their own technology ability, this does not mean that they necessarily have an understanding of how to integrate technology for learning and support should be provided as they utilize technology in the classroom (Morrison, 2019). Teachers in Morrison's (2019) study expressed that after beginning a 1:1 technology implementation, more professional development on technology use related to each

specific content would have been beneficial in developing their pedagogy and implementation in the classroom. This study also found that instructional coaches were able to support teachers in using technology throughout the implementation process, but the coaches were not always fully trained in the pedagogy and content needed for different teachers at different levels.

The recent COVID-19 pandemic and shift to remote learning has also created a new necessary requirement for trainings for teachers. Teachers were forced to quickly learn how to utilize new technology tools while adapting to a whole new teaching environment. This quickly brought to light the lack of training and preparedness teachers have in being able to design instruction utilizing technology effectively (Trust & Whalen, 2020). Teacher education programs need to prepare teacher candidates with the pedagogy skills necessary to incorporate technology into a potential online environment (Kaden, 2020).

COVID-19 Impact

In the beginning of 2020, the COVID-19 pandemic hit the United States, resulting in impact towards what learning looks like for students. Schools were forced to switch to an online learning environment as students were no longer allowed to come to school for face-to-face instruction (Ghazali, 2020; Morgan, 2020). This resulted in many challenges, especially in districts that had not already been implementing a 1:1 technology program. Many districts and schools needed to provide a device for all students that did not have access to anything at home and problem solve solutions for families that have little or no internet access (Morgan, 2020). Schools needed to problem solve ways to create a

classroom schedule and environment and engage students in a fully remote system

(Tawafak, 2020). Although schools may have determined ways to get all students access

to a device and internet, this does not mean that an effective learning environment was

achieved. Teachers need to determine how to meet each individual students' needs to

ensure learning can occur (Summers, 2020).

The shift to online learning, required teachers to determine how to enhance

student autonomy and self-access learning. According to Ghazali (2020), this pedagogy

of learning should not be utilized only during a pandemic but should be the philosophy of

education in a typical classroom. Teachers that had been using technology in their

classroom frequently prior to the pandemic were more prepared and comfortable with the

shift to remote and online learning and it became very transparent that there is a large

variation in teachers' ability to use technology to support learning (Trust & Whalen,

2020). Moving forward, districts need to continue discussing and looking at ways to

solve equity issues in regard to technology access at home, ways to build upon

technology infrastructure within the schools, and ways to support and build teachers'

understanding of pedagogy to support technology use in the classroom and in potential

remote or online environments (Kaden, 2020).

Summary

Changes in technology use in the classroom has been changing as 1:1 technology

initiatives across school districts increase (Heath, 2017). The TPACK framework

suggests that an understanding and knowledge of technology, content, and pedagogy

must work together to guide instruction in the classroom (Nelson et al., 2009; Ozdemire,

2016). According to Lawrence et al. (2018), a shift in pedagogy may be necessary to best determine how to effectively use technology for learning. In today's classroom, it is necessary for students to develop 21st-century skills, such as collaboration, creativity, digital literacy, and communication (Varier et al., 2017). The use of technology in the 1:1 technology classroom seeks to provide opportunities for students to develop these 21st-century skills and prepare students to be digital learners (Anagun, 2018). Although teachers may see the benefits and necessity of technology integration and use with students, without the proper training or understanding of how to incorporate this effectively, teachers may be reluctant to use technology or struggle to use appropriately. In the next chapter, I will explain the research methods involved in this study.

Chapter 3: Research Method

The purpose of this basic qualitative study was to investigate how Midwestern public school early elementary teachers perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills. In Chapter 3, I provide the research design and rationale and the role of the researcher. The methodology of this study will be explained, including participant selection logic, instrumentation, procedures for participation, recruitment, and data collection, data analysis plan, issues of trustworthiness, and ethical procedures.

Research Design and Rationale

After determining the purpose of this study, I developed the research question. The research question then helped determine the qualitative research design. This section includes the research question and the rationale for the basic qualitative approach of this study.

Research Question

How do public school early elementary teachers in a Midwest suburban region perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills?

Rationale for Research Design

The basic qualitative approach was used in this study to examine the perceptions of early elementary teachers who have utilized 1:1 technology in their classroom. According to Merriam and Tisdell (2016), the basic qualitative approach is one of the most frequently used types of qualitative approaches in education. The purpose of a basic

qualitative study is to gain an understanding of how people make sense of their lives and experiences (Merriam & Tisdell, 2016). In a basic qualitative study, a researcher uses interviews to interpret the meaning and experiences people have. Because the purpose of this study was to explore the perceptions of early elementary teachers using 1:1 technology, this research design allowed for the exploration of the experiences and feelings these teachers have. This research design also provided an opportunity for teachers to share their own teaching pedagogy in the early elementary classroom and how the use of 1:1 has influenced their teaching pedagogy and content in the classroom in regard to the TPACK framework.

Other qualitative approaches were considered for this study and determined to not be the best choice. A qualitative case study examines a specific case or phenomena happening in its natural setting (Harling, 2012). Through this type of holistic inquiry, multiple sources of data are collected through interviews, observations, collection of artifacts to develop a deep understanding of what is occurring in this specific case. Because this study was an exploration of the perceptions of teachers and not what is occurring in the classroom, the case study approach was not the best method. In heuristic inquiry, the researcher looks at their own experiences in relation to the studied phenomena (Patton, 2015). In this type of study, it is important the researcher continues to connect their own beliefs throughout the research process and to use phenomenological reduction to continually return to what the essence of the experience is throughout the data analysis (Donalek, 2004). I did not choose heuristic inquiry as I was not seeking to

look at my own experiences but only the perceptions of the teachers currently experiencing this type of learning in the early elementary classroom.

Role of the Researcher

In this study, my role was to serve as primary investigator. I was responsible for determining the research design and interview questions for this basic qualitative study. I conducted one-on-one interviews with my participants virtually using Zoom. I was responsible for developing the interview questions and any necessary follow-up questions. The interviews were recorded using Zoom's audio-only recording feature and subsequently transcribed. I did not share my own personal opinions and thoughts, and I acted only as a listener and interviewer. It was my role as the primary investigator to develop the process for collecting and analyzing the data.

The participants in this study worked in the same district I worked in. At the time of the study, I was a digital learning coach for the district, and although I was on the same teacher contract as the participants, I did work with administration more frequently including principals and directors. This may at times give teachers the impression that I have a higher role than them or they sometimes view me more as an administrator. My role was to work with teachers to help them utilize technology in the classroom for learning. Participants in this study were not from the buildings where I currently served as a coach. This prevented me from interviewing anyone I have personally had any coaching sessions with. I also assured participants that their answers were confidential and were strictly for the purpose of this study. My own personal opinions and thoughts were not shared with participants.

Methodology

In this section, I explain the methodology of this qualitative study. After describing the participant selection logic and the instrumentation used for this study, I provide an interview guide and address procedures for recruitment, participation, and data collection. This will be followed by a description and justification of the data analysis plan. Any issues of trustworthiness and ethical procedures associated with this study are also addressed.

Participant Selection Logic

Participants in this study consisted of four early elementary teachers at the K-3rd grade level. Purposeful typical sampling was used in this study. According to Patton (2015) purposeful sampling allows for analysis of information-rich cases. This also allows for reduced bias and is an effective approach when the group or category being studied has more potential cases than what is able to be studied in the time frame of the study (Patton, 2015). Through purposeful sampling, I selected four K-3 classroom teachers to partake in an approximately 20- to 30-minute interview. Because of the COVID-19 pandemic and the stress and time constraints teachers were facing, many potential participants declined to participate. Participants consisted of teachers from a public, suburban school district in a Midwestern state. In this district, teachers have been implementing a 1:1 technology program with Chromebooks for 4 years. Because this study was based on the experiences of utilizing 1:1 technology in the early elementary classroom, participants must have met the criterion of teaching for at least 2 years in a kindergarten, first, second, or third grade classroom and have utilized the 1:1

Chromebooks for learning in the classroom. The selection size consisted of four teachers to ensure that all grade levels K-3 are represented in the study. The sample size through purposeful sampling was appropriate as it allowed for the gathering of more in-depth information about the participants' experiences (Miriam & Tisdell, 2016).

At the time of this study, I worked in this school district as a digital learning coach in two specific elementary buildings. I received institutional review board (IRB) approval to begin the data collection process. After IRB approval, participants were selected from four different elementary schools in the district. Participants could not be from the two buildings I directly worked in to ensure there was no previous or current work relationships with these participants. I also considered my own personal biases I may have had regarding technology use in the classroom. I practiced reflexivity to ensure my own beliefs or opinions did not come across or interfere with the interview process.

The district required their own application with the study details to be submitted and approved by the district director of research and analytics administrator in order to conduct research within the district. According to the district guidelines for research, the district name, school names and participants' names were not to be used. I used pseudonyms to maintain confidentiality. The district guidelines also stated that participation in the study was voluntary and participants may choose to leave the study at any time. After I completed the district application for research, the district posted a study invitation in their district weekly update.

Instrumentation

Interviews were conducted to gather data for this study via a recorded Zoom meeting. Each interview was recorded through Zoom to allow for transcribing and coding. Only audio, not video, was recorded during the interviews. Efforts to ensure credibility and content validity throughout the interview process were used. Peer debriefing was done with my dissertation committee throughout the process. Member checks were also used. Through member checks, the researcher checks preliminary findings with the participants to ensure the researcher's interpretation is accurate with what the participant was trying to convey (Merriam & Tisdell, 2016). I utilized an interview guide during the interviews.

This interview guide was designed to align my research questions to the interview questions (see Appendix) for this qualitative study. Merrian and Tisdell (2016) explained how semistructured interviews in qualitative studies allow the researcher to have guided questions to gather information related to the phenomenon in a more flexible manner, enabling the researcher to respond to the participant's experiences. The interview guide was developed for this study to provide guiding, flexible questions in order to elicit the experiences and perceptions of the participants. Patton (2015) suggested that interview questions should remain open-ended to allow participants to respond in their own manner. The questions in this interview guide provided an opportunity for participants to elaborate and reflect on their own experiences. The interview guide in the appendix shows that each interview question aligns to the research question. These questions were also developed to incorporate the TPACK framework. Interview Questions 1, 2, and 3

were designed to gain an understanding of teacher's current pedagogy and content knowledge by asking what is important for students at this age to be learning, including what necessary 21st skills are important for learning. Interview Questions 3–6 built upon how teachers are incorporating their technology pedagogy content knowledge (TPACK) in the classroom. Insight into teachers' perceptions on the strengths and challenges was specifically asked to answer the research question with the opportunity to explain and expand on their specific experiences. Interview Questions 5–8 supported the research question by looking at the strengths of 1:1 devices to support instruction of specific content areas and interview questions nine and ten align by looking at the challenges. Interview Question 10 aligns to the research question and the TPACK framework by allowing participants to reflect on how their use of technology to support pedagogy and content may have changed after their experiences.

Procedures for Recruitment, Participation, and Data Collection

After receiving IRB approval, I needed to obtain approval through the district's research application process as well. Once this was completed, I worked with the district director of research and analytics to ensure that I followed their means of recruitment that met my purposeful sampling of participants as well. Criteria for participants included teaching for at least 2 years at the kindergarten, first, second, or third grade level and currently utilizing the Chromebooks in the classroom.

Once participants were identified through the recruitment process, I sent an invitation email informing potential participants about the study. Participants were informed that their participation would include a 20- to 30-minute virtual interview and a

member check following the transcription of the interview to ensure the information was interpreted accurately. A letter of consent was also included in the invitation email. Once participants returned their signed informed consent, I sent them instructions to join the Zoom link at the agreed-upon interview time. The interview was recorded in Zoom for audio purposes only and then transcribed. I also took observational notes during the Zoom interview. The transcription and notes were shared with the participants following their interview to allow for member checks and any necessary changes. Participants were sent a follow-up email thanking them for their participation.

The data source used for this study consisted of semistructured interviews. There was one round of individual interviews, and each individual interview was expected to last 20–30 minutes. Interviews took place virtually using Zoom and were recorded for audio purposes only. Interviews were transcribed using Zoom's transcribing feature and then checked for any necessary changes through member checks with the participants.

Data Analysis Plan

Thematic analysis was used in this study. Thematic analysis is a method of analyzing data, such as interviews, to determine themes (Caulfield, 2020). Through the coding process, I was able to determine themes that help answer my research question. Initial coding was used for the first cycle of coding. According to Saldaña (2016), initial coding is a first-cycle, open-ended coding approach that is appropriate for qualitative studies utilizing interview transcripts. Through the coding process, I pulled out the key phrases participants said during their interviews. In the second cycle of coding, I used pattern coding. Through pattern coding, data for the first cycle coding are grouped into

smaller categories, themes, or concepts (Saldana, 2016). Through this process I was able to determine the themes or categories from my participant's responses. I utilized a system of hand coding in Microsoft Excel for the coding process.

In order to increase the credibility and trustworthiness of the study, alternative explanations for all data should be provided (Patton, 2015) Any discrepant data, or data that do not match what is expected by the researcher (Merriam & Tisdell, 2016) were included within the analysis of the study. Discrepant case analysis or searching for any data that go against the emerging data (Meriam & Tisdell, 2016) was utilized to ensure a deep analysis and description of the data. I dealt with any discrepant cases by including these data, along with the common themes, to build trustworthiness of the study and to provide the entire picture of the study.

Issues of Trustworthiness

Establishing trustworthiness is vital to any research study. According to Merriam and Tisdell (2016), it is important to discuss trustworthiness and rigor of a study by building validity and reliability within the research design. A study's trustworthiness can be determined by looking at the credibility, transferability, dependability, and confirmability of the study. In this section, I will explain how I addressed these areas within my research design to meet issues of trustworthiness.

Credibility

The credibility or internal validity of a study looks at how research findings match reality or the real world (Merriam & Tisdell, 2016). In a qualitative study, the participants are providing their own interpretation of their reality related to the phenomenon and is

important as the researcher to have a clear understanding of their perspectives (Merriam & Tisdell, 2016). Peer review or peer examination with my dissertation committee was used for feedback throughout the data collection process. I acknowledged the reflexivity, or researcher's position of the study. Reflexivity is when the researcher explains any of their own biases, experience, or assumptions they may have in regard to the research (Merriam & Tisdell, 2016). Member checks were also used to build credibility within this study. According to Merriam and Tisdell (2016), member checks or respondent validation is when the researcher goes back to participants with the initial findings to ensure that the interpretation is accurate to the participants experiences. I also looked for discrepant cases to ensure data saturation (Merriam & Tisdell, 2016) within the data analysis. This was used in this study to ensure the credibility or interval validity of my findings.

Transferability

Transferability or external validity looks at the generalizability of a study or the extent to which this one study can be applied to other situations (Merriam & Tisdell, 2016). The use of rich, thick, description (Merriam & Tisdell, 2016) was utilized to describe the findings of the study including specific quotes from the individual interviews. Although the small sample size impacted the ability of the study to be generalized to all similar situations, I utilized maximum variation in my sample size to build transferability. With maximum variation, there is a variety in the sample size in regard to the participants and sites, to allow the reader greater application to the study

(Merriam & Tisdell, 2016). In my sample size, I had a range in participants from K-3 teachers and they were from different buildings within the district.

Dependability

Because human behavior is never static, it cannot be declared that a qualitative study's findings would repeat; however, dependability, in a qualitative study, expands on this by focusing on the research findings being consistent with the data collected as opposed to the same findings reoccurring (Merriam & Tisdell, 2016). In order to build dependability, I used an audit trail to show how I developed my conclusions. Through an audit trail, a researcher details the process as to how the data was collected, how categories or themes were determined, and how they got to the analysis they reached (Merriam & Tisdell, 2016). This strategy was utilized to build dependability of my research findings.

Confirmability

Confirmability of a study is the degree to which other researchers could confirm the findings of a study (Korstjens & Moser, 2018). This is ensuring that the researcher's own biases, judgements, or opinions did not sway or change any of the interpretations of the findings. This was done through the use of reflexivity, which is the process of the researcher reflecting on their own biases or preconceptions about the research (Korstjens & Moser, 2018). An audit trail was also used to describe how my data was gathered and how my analysis was developed. Merriam and Tisdell (2016) expressed that data analysis and collection should occur at the same time in order to determine data saturation. I

analyzed my data throughout the collection process to determine if follow up interviews were necessary.

Ethical Procedures

In any type of research study, it is vital for the research to follow ethical procedures. According to Merriam and Tisdell (2016), the trustworthiness and credibility of a study rely not only on the methods utilized, but on the integrity and ethical stance of the researcher as well. I followed ethical considerations to ensure this study was trustworthy.

In order to begin this study and prior to recruiting participants, I submitted a research study application to the IRB through Walden University and received IRB approval (# 10-11-21-0744138). The district I conducted the study in also required approval through their research application process. Through this process, the district director of research and analytics was made aware of the purpose of the study and the inclusion criteria for participants. The director of research and analytics supported in seeking participants as well as help to address recruitment ethical concerns by ensuring participants met the inclusion criteria for the study.

I also needed to take into consideration the ethical concern of conducting research in the same district I work in. I continued to be transparent about my role as a digital learning coach in the district and worked with the district in the requirement process to ensure that all participants were not currently teachers in the buildings that I coach in. In the recruitment process, potential participants were provided with information about the

purpose of the study and ensured that their involvement would remain confidential and would have no impact on their role in the district.

The district application for research studies followed the same guidelines as the IRB and stated that participation was voluntary and participants may choose to leave at any time. Potential participants were made aware that participation in this study was voluntary and that the district will not be aware if they chose to participate or not in this study. They were also made aware that their names would remain confidential and that they were able to stop participating in the study at any point in time. Participants that opted out of the study or choose to leave during the study were not to be stigmatized and this information was not given to the district.

The data collection process involved audio recording using Zoom. Participants were made aware that only audio was recorded and not video. Participants could choose to not have their video on during the Zoom interview. The district research application also stated that pseudonyms for the district, any schools, and participants must be used. Transcripts and recordings of the Zoom interviews were collected and stored only by the researcher on a home computer that is password protected.

Another ethical concern I addressed in this study is confidentiality. Following interviews and members checks, all names of participants were removed from the analysis process and letters were used to represent each participant in the data analysis. When participants were interviewed, they were recorded via Zoom for audio only. I downloaded the recording to my hard drive on my password protected home computer

that only I have access to and deleted the recording from Zoom. All the data will be deleted after five years.

Summary

In this chapter, I explained the research design and rationale for my study. This basic qualitative study utilized purposeful selection to interview participants. I also explained my role as the researcher in this study as the primary investigator. The methodology and rationale for participant selection logic and the instrumentation including the interview guide was also discussed. The procedures for recruitment, procedures for participation, procedures for data collection and the data analysis plan was described. Open-ended interview questions allowed for participants to express their experiences and perceptions. Through thematic analysis, codes and themes were determined to draw conclusions about the perceptions of early elementary teachers on the strengths and challenges of using 1:1 technology in the classroom. In the issues of trustworthiness section, I explored ways I built credibility, transferability, dependability, and confirmability within the study. Finally, this chapter ended with the necessary ethical procedures followed in this study. In Chapter 4, I will share the results of this study.

Chapter 4: Results

The purpose of this basic qualitative study was to investigate how Midwestern public school early elementary teachers perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills. In order to explore these perceptions of early elementary teachers, the following research question was used: How do public school early elementary teachers in a Midwest region perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills?

The findings of this qualitative study are discussed in the rest of Chapter 4. This chapter includes a description of the setting and demographics of the participants. It also includes information about the data collection, data analysis, evidence of trustworthiness, results and summary.

Setting

This study was conducted in a Midwestern public school district. There are 15 elementary schools within this district, including Title 1 buildings and dual-language programs. This district has utilized Chromebooks in a 1:1 technology environment for the past 5 years. All early elementary teachers within the district were made aware of this study through a weekly update they received from district administration. To be included for this study, participants must have taught at the K-3 level for at least 2 years and utilized Chromebooks in a 1:1 technology classroom. In order to increase the credibility of the study, there were two elementary schools in which study participants could not be solicited because I currently work at those schools as a digital learning coach.

At the time of this study, the COVID-19 pandemic was still impacting schools. Teachers in the study site district had returned to face-to-face instruction after a year of teaching in a remote environment due to the COVID-19 pandemic. Teachers at this time were navigating returning to in-person instruction and still managing students that may be quarantined. Participants were also experiencing constant changes in COVID-19 mitigations and expectations of their classrooms. It is reasonable to assume that participants' levels of stress may have been impacted due to the pandemic.

Demographics

The study invitation was included in the weekly update for 5 weeks, and five teachers reached out; however, only three of these teachers scheduled a Zoom interview. Due to low participation, I received IRB approval to make a change to my original IRB procedures to have the district research director email specific principals asking them to directly send the study invitation to their K-3 teachers. Three more teachers reached out, but only one of them participated in the Zoom interview. Several other teachers reached out in response to the invitation, but they work in the two buildings I support as a digital learning coach, so I had to deny their participation to ensure credibility and trustworthiness of the study. After 2 months of trying to get more participants, I had to settle on only having four participants for this study. A small number of participants was taken into consideration throughout the data analysis process when looking at the transferability of the study. It is likely that due to the stress of the COVID-19 pandemic, teachers were less willing or available to participate in a study at this time. In order to ensure confidentiality of the participants in the study, pseudonyms were assigned to each

participant and the district. Participants were reminded that their participation in the study was voluntary and that they could leave at any point during the interview. All four of the participants were female. Participant A taught second grade, Participant B taught first grade, Participant C taught third grade dual learning, and Participant D was currently teaching first grade and has taught kindergarten in the past. Each participant taught at a different elementary building, consisting of Title 1 buildings, non-title buildings and dual language classes. Table 1 lists the participants pseudonyms, current grade level taught, gender and school site building pseudonym.

Table 1

Participant Demographics

Participant pseudonym	Grade level	Gender	Building pseudonym
Participant A	Second grade	Female	Red
Participant B	First grade	Female	Blue
Participant C	Third grade	Female	Green (dual language/Title I building)
Participant D	First grade	Female	Purple

Data Collection

Interviews in a basic qualitative study allow for researchers to gain an understanding and interpret the experiences people have (Merriam & Tisdell, 2016). Semistructured individual interviews were utilized as the data collection in this study to gain insight into the perceptions of early elementary teachers.

All semistructured individual interviews were conducted via Zoom. Participants were emailed a unique invitation link to join the Zoom meeting. Participants chose a day

and time that were convenient for them to conduct the interview. The Zoom application allows for the recording of a meeting. Participants were reminded that the interview was being recorded for audio only and they could choose to turn off their cameras if they prefer. All four participants chose to leave their cameras on throughout the interview. Each interview lasted about 20 minutes. I used an interview guide of questions (see Appendix) to ensure alignment to the research question and develop consistency across interviews. The use of open-ended questions allowed participants to respond with their own experiences and reflections. The questions were also designed to align with the TPACK framework that served as a guide throughout this study.

Each Zoom interview was recorded and then transcribed using the Happy Scribe program. I listened to the recordings again to check for accuracy, and changes were made to the transcriptions to ensure they matched what the participants said. All recordings and transcriptions were stored on my password-protected computer and in my password-protected cloud account to protect all data from being lost or accessed. Initial coding was done for each participant's interview. I identified the keywords and phrases and wrote a summary of each response. In order to build credibility, I emailed a copy of the transcription and initial coding individually to each participant as a member check. Two of the four participants responded to the member check saying everything was good. Due to the low level of participants in the study, data saturation could not be fully met. However, I was able to analyze the insights from these participants for any consistent themes. Following each interview, I reflected on any research biases. During two of the interviews, the participants made a comment about how their response may "mess up the

data" or may "not be the response I am looking for." I reiterated to them that the purpose of this study is to gather the true perceptions, feelings, and experiences early elementary teachers have and that I appreciate their honest responses.

Data Analysis

The study included fewer participants than expected, but the data analysis plan was followed as explained in Chapter 3. This analysis plan was consistent with Patton's (2015) and Saldaña's (2016) suggestive data analysis process for a basic qualitative study including initial coding, pattern coding and thematic analysis.

Before beginning the coding process, I reread my transcripts while listening to the audio to check for consistency, as well as to build my knowledge and familiarity of the data. The data was then moved into a Microsoft Excel sheet with each individual interview on its own sheet. Initial coding was used for the first cycle of open-ended coding (Saldaña, 2016). The initial codes can be seen in Table 2. This hand-coding process was done in Microsoft Excel to allow for the use of highlighting, different colored text, copy and paste, and multiple cells and tabs to compare data. This also allowed me to continue to develop a stronger connection with the data as I reread and copied and pasted it in different locations instead of utilizing a coding software program. The codebook included key phrases or words that were marked in different colors, and the keywords were coded for each individual interview. I went through this process twice for each individual interview to ensure I was not missing anything and to reduce any possible biases. I wrote a short summary for each participant's response to every question as well. I sent a copy of the transcript, summaries, and initial coding to each participant

for them to review and provide any feedback or changes they may have. Two participants

responded with their approval. Two participants did not respond.

Table 2

Themes, Categories, and Initial Codes

Themes	Subthemes	Initial codes	Discrepant cases
Learning in the early elementary classroom	Content knowledge	Phonics, letter sounds, counting, writing, foundational skills	
	Pedagogical knowledge	Hands-on learning, movements, learning modalities, student differentiation	
	21st-century skills	Collaboration, communication, responsibility, independency, computer skills	
Technology use for student learning	COVID-19 impact	Virtual learning, increase in use	Ineffective
	Student-centered learning	Digital tools, review, practice, Google activities, Pear Deck, Book Creator, digital curriculum, centers, iReady, Istation	
	Changes over time	Increase in use, student expectations, student abilities	Decrease in use
Strengths of using a 1:1 Chromebook		Student ownership, student creation, student independence, building confidence, immediate feedback, student differentiation	Ineffective
Challenges of using a 1:1 Chromebook		Time consuming, not age appropriate, need for hands-on learning	Charging, internet

Another round of coding of each individual interview occurred to combine any

repeating codes or similarities. As suggested by Patton (2015) and Merriam and Tisdell

(2016), any outlying data or discrepant cases were noted in order to build the

trustworthiness of the study. Coding across participants was then done to find any similar

categories and codes. The use of Microsoft Excel allowed me to add a new sheet within the same document to allow another way of viewing the data and any possible similarities or outliers. Another round of pattern coding was used to group the initial codes into smaller categories (Saldaña, 2016) to create emerging themes. These categories or subthemes can also be seen in Table 2. Several categories that emerged from the data aligned with the TPACK framework, as well as other categories. I revisited these data over several days in order to look at them again with fresh eyes for new insight. These categories were then grouped into potential themes. I first created a draft of the possible themes and revised them as I continued to review the data and determine the best relatable theme. The categories were used as subthemes of each theme. I also reexamined the data, continuing to be aware of any possible biases I may have related to the data to ensure that my own opinions or beliefs were not influencing my categories or themes.

After identifying the themes and subthemes of the study, I went through the data again to color coordinate any specific quotes that directly related to each theme. I also utilized the search function in Microsoft Excel to look for any key phrases or words that may be related to the themes. I created another sheet in the Microsoft Excel codebook for each theme. Then the subthemes within that theme were listed and any specific quotes related to the category, along with any outlying data, from each participant were listed. The following themes that were found included learning in the early elementary classroom, technology use for student learning, strengths of utilizing 1:1 Chromebooks, and challenges utilizing 1:1 Chromebooks. The subthemes found were content knowledge, pedagogical knowledge, 21st-century skills, COVID-19 impact, student-

centered learning, and changes over time. I identified discrepant cases within the themes

of technology use for student learning, strengths and challenges of utilizing the 1:1

Chromebooks where a participant had a different perspective than the others. These

discrepant cases were noted in the data analysis process and are mentioned in the results

of the analyses. Table 2 includes the themes, categories, initial codes and discrepant cases

that were identified through the data analysis process.

Evidence of Trustworthiness

It is imperative to a research study to establish trustworthiness. According to

Merriam and Tisdell (2016), it is necessary to build validity and reliability within the

research design to establish trustworthiness. Credibility, transferability, dependability,

and confirmability are the key elements of trustworthiness in a study (Ravitch & Carl,

2016).

Credibility

Efforts to ensure credibility were taken throughout the data collection process.

Credibility is how the findings of research match with the real world (Merriam & Tisdell,

2016). In order to build credibility in this study, I used member checks by sending the

transcripts and initial coding to the participants for their review. Participants were able to

ensure that the interpretation of their responses was accurate and make any changes. I

also identified any discrepant data or outliers and included that within my analysis. I also

acknowledged my own reflexivity or role within the study. It was vital in this study to

examine my own biases or assumptions related to the data (Merriam & Tisdell, 2016) in

order to build credibility and ensure my own opinions were not present in the data

collection process or within the data analysis. There were no changes made to the credibility strategies listed in Chapter 3.

Transferability

Transferability is the extent to which a study can apply to other situations or the generalizability of the study (Merriam & Tisdell, 2016). Due to the small sample size of participants, the generalizability of this study is limited. Rich and thick descriptions, including specific quotes were utilized to help build the transferability of the study (Merriam & Tisdell, 2016). The participants consisted of teachers that have taught each grade level within the K-3 grade band and are each from different elementary school building sites within the school district. This use of maximum variation, or variety in sample size and sites, within the small sample size helps to build transferability by building reader application (Merriam & Tisdell, 2016). The sample size of this study was smaller than expected, impacting the study's transferability. I worked to ensure I had descriptive data from each participant and to allow them to explain their experiences, in order to allow others reading the study to determine whether the data are transferable or relatable to them.

Dependability

In order to build the dependability, or consistency of the research findings with the data (Merriam & Tisdell, 2016), I used an audit trail throughout the data collection and analysis process. Merriam and Tisdell's (2016) method of detailing the data collection process, how the categories and themes were developed, and the discovered analysis was utilized in this study to develop the audit trail in order to build the

dependability of this study. I did not make any changes to the dependability strategies suggested in Chapter 3.

Confirmability

Confirmability in a study is how accurately another researcher could confirm the findings in a study (Korstjens & Moser, 2018). In order to build confirmability in this study, I kept a reflexivity journal to reflect on my own biases and opinions prior to, during, and following the data collection process. This use of reflexivity allowed me to ensure that my own preconceptions would not interfere with the data. I used reflexivity to ensure that I was not swaying or providing any misconceptions to participants about my own beliefs about the study. I also utilized an audit trail to detail the process I followed as I gathered my data and developed my analysis. The audit trail was tracked in Microsoft Excel with that data showing each step within the coding process that was used. I would also listen to the recordings following each interview to build my understanding, check for biases, and allow for data analysis throughout the data collection process. I also used member checks by sending the transcripts and initial coding to each participant to allow them to provide any changes. I did not make any changes to the confirmability strategies listed in Chapter 3.

Results

In this basic qualitative study, I was seeking to answer the following research question: how do public school early elementary teachers in a Midwest region perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills? The TPACK framework was a driving force in this

study to gain insight into teachers' content and pedagogical beliefs and how that connects to their use of technology at the early elementary level. The research question in this study was answered as participants expressed their beliefs and experiences utilizing 1:1 Chromebooks in their classrooms. Participants shared what they believe is important for students to learn at the early elementary level, as well as how students at this age learn best. Participants also shared their experiences utilizing the Chromebooks for learning and any strengths and challenges they face with implementing the use of the Chromebooks.

The following themes emerged from the results of the study: learning in the early elementary classroom, technology use for student learning, strengths of utilizing 1:1 Chromebooks and challenges utilizing 1:1 Chromebooks. Theme 1, learning in the early elementary classroom, contains the subthemes content knowledge, pedagogical knowledge and 21st-century skills. These subthemes explore teachers' pedagogical and content beliefs as well as what 21st-century skills are important for learning in the early elementary classroom. This theme and subthemes help support the TPACK framework utilized in this study. Theme 2 describes how early elementary teachers are utilizing 1:1 Chromebooks in the classroom for learning and contains the subthemes, COVID-19 impact, student-centered learning and changes over time. This theme and subthemes support the TPACK framework and provide insight into how teachers are utilizing the 1:1 Chromebooks for learning. Theme 3 identifies the strengths teachers feel utilizing the Chromebooks provide, and theme 4 identifies the challenges teachers face. Themes 3 and

4 directly answer the research question and state the specific strengths and challenges early elementary teachers perceive when using the 1:1 Chromebooks for student learning.

Theme 1: Learning in the Early Elementary Classroom

The first theme that emerged from the data was learning in the early elementary classroom. This theme developed after a compilation of codes and categories emerged based on how and what students learn in the early elementary classroom. This connection to the TPACK framework in this study, resulted in this theme. In order to gain an understanding of the participants' beliefs in relation to the TPACK framework, they were asked to respond specifically about what content students should learn and how they learn best. The following subthemes emerged within this theme: content knowledge, pedagogical knowledge and 21st-century skills.

Content Knowledge

The overall result from all four participants related to this subtheme was a belief in a need for students at the early elementary level to learn the basic foundations of reading. Three of the participants specifically mentioned phonics skills such as letter names and sounds. Included with this description were basic math skills, such as counting and number sense. The basic foundational skills of writing were also mentioned as a necessary learning skill in the early elementary classroom. Participant A said,

> A lot of foundational skills like reading, beginning reading skills, phonics, letter
> sounds, those kinds of things. Writing skills. I would also say maybe in math, just
> basic number understanding and beginning those foundational skills for math as
> well. Number sense and counting, those kinds of things.

Participant C stated,

> If we don't have the basics, I can't take them to the next level. Basic writing
>
> skills, letter formation, how to space a word, how to a letter, how a paragraph
>
> looks. I would love to include science and social studies in there. In a perfect
>
> world, I would have time. I don't. I don't have enough time.

Participant B went beyond just curriculum that should be learned but expressed that

students in her Dual Language class should be gaining a love of learning. She stated,

> Their confidence will grow more as they feel more confident with the content in
>
> each area, not only in Spanish, but in English and math. As they feel more
>
> confident, I think that helps them to develop that drive to keep going and learn
>
> more.

This subtheme supports what teachers believe to be important for students to be

learning in the early elementary classrooms. Content knowledge is an important element

to the TPACK framework utilized in this study. The results in this subtheme show that

the participants believe it is important for students to be learning the basic foundational

skills in reading, writing and math.

Pedagogical Knowledge

Pedagogical knowledge is a teachers' understanding of how students learn

(Koehler et al., 2013). All four participants expressed the view that students at the early

elementary level learn best through hands-on learning. Participant D specifically said

students learn best through "Hands on instruction, like hands on manipulatives and things

to do.*"* Participant A also stated, *"*Students learn best by doing something that's more

hands-on. Interactive things where they get more immediate feedback so that they can maybe experiment and then try again."

Three of the four participants also elaborated on the importance of differentiating, not just for skill level, but differentiating how learning is occurring based on different learning modalities. Participant B stated, "I think we have students that come from different backgrounds with different learning modalities. So I think providing opportunities of different ways of learning the same thing." Participant C explained how after having a deaf student in her class years prior, she has utilized sign language in the class to teach students new skills. She explained:

I still teach with a lot of sign language because I found that if the kids can make the letter with their hand in sign language, the letter looks like your mouth. So if I sign the letter, it makes the same shaper as their mouth. So it helps with spelling. It helps with adding and subtracting and multiplying because it gives them that extra piece of information in their schema. So it's that tactile and kinesthetic type learning.

Pedagogical knowledge is another important element of the TPACK framework. This subtheme provides insight into the perceptions of these participants into how students learn best. The results of this subtheme show that these participants believe students learn best through the use of exploration of hands-on learning and through the differentiation of activities.

21st-Century Skills

Participants were asked what types of 21st-century skills they believe are important for students at the early elementary level to learn. Two of the participants responded with specific technology skills. These two participants discussed how basic computer skills and basic navigation skills are necessary for students at this age to learn. Participant A expressed that keyboarding is not an age-appropriate skill, but basic computer skills are still needed. She stated, *"Personally, I think at this age keyboarding is not appropriate for them. Their fingers aren't big enough and the keyboards aren't made for that. But just kind of navigating, like mouse or cursor or touch screen skills where they can manipulate things online."*

When specifically asked about 21st-century skills, only one participant mentioned student independence and responsibility. However, throughout participants' responses to other questions related to what their students do in the classroom, all participants mentioned developing student independence and accountability in their learning. One participant expressed collaboration and communication as important 21st-century skills. Participant C also expressed the importance of students learning computer safety. She said, "They need to know how to safely use the internet. I think that part gets left off, or they are so naïve. Those skills of I don't want to type my name in just anywhere. I shouldn't just go on YouTube. I shouldn't go on TikTok on my Chromebook." Participant B also mentioned that computer safety is a common theme now in learning for students with their Chromebooks and how to safely and responsibly use the internet is discussed much more than it used to be in the classroom. This subtheme provides insight

into what 21st-century skills the participants feel are important for students to learn in the early elementary classroom. This is an important element to understanding how teachers understanding of 21st-century skills are incorporated into their pedagogy and content knowledge.

Theme 2: Technology Use for Student Learning

Theme 2 developed as a compilation of codes and categories that teachers expressed about how they have utilized technology in their classrooms. This theme is important in showing how teachers are utilizing technology in the early elementary classroom to support student learning. The following subthemes emerged from the data: COVID-19 impact, student-centered learning, and changes over time.

COVID-19 Impact

Due to the timing of this study in the midst of the COVID-19 pandemic, this was current on teachers' minds and had a direct impact on student learning and teacher instruction. All four participants mentioned the COVID-19 pandemic throughout their interview. The previous year all teachers in the district were teaching remotely, utilizing Zoom to meet with students. Three of the participants reflected that their use of the Chromebooks increased during the pandemic when they were strictly in a remote learning environment and that having the 1:1 Chromebooks allowed for learning to continue. Participant A stated that because of COVID-19, the district started having first grade students bring home their Chromebooks every day. She said, "I actually am in favor that they started sending them home in first grade, even though that was really basically because of COVID because I do feel like they are more comfortable kind of trying and

clicking around." Participant B also mentioned how she utilized the Chromebooks during the remote year of learning. She stated, "Last year I did do a lot of working documents, so the kids were able to work together and still be able to communicate while we were in quarantine." Participant A also stated, "They were able to kind of still be learning something and I was still able to give them feedback and see what their work was by being able to use the 1:1. Whereas had they not had those tools, it just would have been harder, I think, to kind of get a good sense of what they're learning. So I mean, that really was such a benefit that year."

Although three of the participants discussed how the 1:1 Chromebooks made learning possible during the remote learning time, a discrepant case with the opposite perspective arose. Participant D did reflect on how she utilized digital tools more during the quarantine; however, she felt like learning remotely was not effective. She stated, "The digital books and the digital way we were teaching, they didn't learn how to read or write. It didn't work. I think we could say that the data is in. Kids don't learn on Zoom. I think that's fair to say."

Student-Centered Learning

Another subtheme that developed is how teachers utilize the 1:1 Chromebooks in their classrooms for student-centered learning. Three of the four participants mentioned using the Chromebooks as a center rotation during ELA and/or math. During this time the students would be working independently on an activity on their Chromebooks allowing the teacher to meet with other students. Participant B stated:

I have all my activities and lessons in the Chromebook. So let's say we do our

center rotations and I do have a lot of copies and paper like activities like hands

on. But at the same time also have a couple of centers where the students have to

go and work in their own math skills or Spanish or whatever the rotations that I'm

doing, they're using, and I have everything in there. So for centers, I have a little

activities like a center. Like what do you call it? Like a folder where they have all

the activities for each area. So I don't know what I will do if the internet goes out

and probably like, brainstorm and be like, quick, let's do something different. But

I have everything there now that I think about it, and we don't use the

Chromebook all the time. But centers is my main use of the Chromebook.

Participant C also explained her use of Chromebooks for centers:

I do use it as a center for reading, so my kids will be reading with me, which I do

use a small reading book because they do need that tactile reading pointing. But

then I use it as a center where they're getting phonic skills. So in it, I have their

spelling words for the week and they'll have the spelling sound, and then they'll

have to sort the words or they'll have to type the words or they'll highlight the

words. I have a couple of different types of slides that I use, so they're still getting

it. Yeah. And then I do the same thing for math. So they'll get a math lesson from

me, and then they'll have a math center on their Chromebook and that math center

has a video and then it has an activity.

Each participant discussed the different digital tools or applications they use with

their students on the 1:1 Chromebooks. All four participants mentioned using Google

activities such as Google slides. Participant B explained how she creates activities in Google slides that might have students "dragging and forming words" or "matching" for addition and subtraction. Participant A said, "We've been able to do a lot of Google slides type of activities, especially more so last year than so far this year, just incorporating some of those basic skill practices into like a Google slide thing." Participant D expressed how she used Google slides more during the pandemic saying:

Then we have Google slides that actually we had a lot more success with. Our own teacher made Google slides during the pandemic we were able to give the kids those they were skill-based slides that were a lot of matching, so they could like slide images for basic numeracy, letters, spelling, addition and subtraction almost like a visual. So it would be a word problem, but a visual problem that they would be able to solve, which was really good for the preliterate kiddos. So Google slides. We had a lot more success with using them for basically homework, like instead of a paper and pencil piece of homework, they would do a set of Google slides that we had uploaded for them.

All four participants mentioned using I-ready, a digital program that provides lessons in reading and math to students based on how the student does on a diagnostic test. Teachers are also able to assign individual lessons to students in this program. All participants also discussed how all of their curriculum in reading, math, science and social studies is digital. Participant B stated, "The 1:1 are huge. They were huge before the pandemic because they are our textbooks. So in our room, all of our textbooks are on the Chromebook, except we do have a math workbook. So our reading is on there and our

writing, science, social studies." Participant D reflected on how she uses the digital

curriculum for students to reread books they have read in class but teaches with physical

books. She said,

> Our Ela curriculum, our Basil is Wonders, and that also has all the books that we
>
> use in the classroom and they are also digitally loaded so that kids can access
>
> them as well. During the pandemic, we used the digital ones. In real life, they like
>
> the Wonders books that we've read in class. Like I said, they like to do what we
>
> did whole group by themselves. It makes them feel successful. That's probably
>
> their favorite. But as far as me for teaching reading, I always use paper books we
>
> actually found.

This subtheme is important in showing the main way these early elementary

teachers are utilizing the 1:1 Chromebooks in their classrooms. This is an essential

element of the TPACK framework and necessary to understand the answer to the

research question of this study. These results are consistent in showing how these

participants utilize the digital curriculum and tools such as Google slides during center

rotations to support student-centered learning.

Changes Over Time

Another subtheme that evolved is how teachers' use of technology and the 1:1

Chromebooks has changed over time. Participant A reflected on how it is easier to use

technology in the classroom since shifting to 1:1 devices, "It's definitely been easier to

incorporate it in because they all have their own device to work on rather than back not

so long ago where we were sharing computer labs of things like that. I definitely think the

1:1 has kind of boosted us in that area." She also said, "I definitely just more frequent use of it, especially since they all have them now and get to take them home. I've always been very comfortable using it, so I know that hasn't exactly changed for me, but I think also being able to expect more of what they can do on there." Participant B also reflected on how she uses the Chromebooks more often saying, "I see now how cool it is that they can bring their own Chromebook and do their own activities and everything on the Chromebook. So it has changed for that reason." This subtheme provides insight into how these participants use of the 1:1 Chromebooks and technology in the classroom has increased over time.

It is important to note any discrepant cases found within this subtheme of changes in technology use over time. Participant D expressed how in the district the 1:1 initiative in kindergarten originally began with iPads that she utilized for centers and found to be beneficial in allowing students to work on an independent activity. She discussed how the switch to Chromebooks made it more difficult, as students run into trouble with logging themselves in and they require much more support to utilize the Chromebooks. She described how her use of technology in the classroom has decreased over the years as the district has shifted the type of technology used and the programs they are allowed to utilize.

Theme 3: Strengths of Utilizing 1:1 Chromebooks

All four of the participants explained strengths that they have found utilizing the 1:1 Chromebooks in their classrooms. This is a vital theme in answering the research

question of this study. The following strengths were identified: student independence and ownership, feedback, student differentiation and fun.

Three of the four participants mentioned student independence and ownership in their learning as a strength of utilizing the Chromebooks. Participant B stated,

I guess, the independence that they get. I mean, they're only six and they've been able to figure out and find activities and submit them. It took a while. Let me tell you, but with practice and consistency, I think they have been able to become independent and also feel successful and feel excited about the things that they've been learning, because I think it's a lot. When do we ever do that? So to me, they're becoming independent. They're becoming confident. So I don't know, I'm proud of them.

Participant A also mentioned student ownership, saying, "I think that the digital component kind of gives them another outlet to kind of have something of their own to kind of take ownership of. Participant D also reflected on this by saying,

Well for the kindergarten students, they really liked being able to almost copy what we are doing whole group. So we do like the Google slides whole group and that was kind of what we would use to teach. Then we would upload them again and the kids could do them by themselves on their Chromebooks. So they loved feeling like very successful like they were the teachers. So just that sense of I can and confidence-building. They've very comfortable with technology. So it was lot easier for kids to feel like they can read a book if they can just open up a digital book and have it read to them.

Although Participant D stated how the ability to complete the activities on their Chromebooks is building student confidence, she did have an outlying reflection on student independence.

When we started 1:1, kindergarten had iPads, and those were usually the first independent work center that I gave the kids because they didn't need any instructions. So I would not open my library for about two and a half weeks because they had to learn how to manage books but I didn't have to give any instructions for how to handle an iPad. So I could just preload it with stuff and give it to them. So that was usually the first center that they had where we started building stamina for them to work independently. Chromebooks were very different though. The way our district uses Chromebooks is very curriculum-based, and so I found it very difficult for the students to use independently. They need a lot of adult support and adult supervision. The logins were not kid-friendly because they have control shifts that they have to do. And if you don't know your numbers and letter yet you can't log yourself in. So I actually found that Chromebooks they were a lot more work for me as a teacher and didn't give the kids enough skills or content at that age as much as other activities that I could do in the same amount of time. So I kind of found them to be not very effective in the learning process for kids that little.

Another strength mentioned by three of the four participants was the ability to provide immediate feedback to students or allow the teacher to quickly see where the students are in their learning. Participant C stated how the learning management system

used in the district has helped with allowing her to see student learning. She said, "The PowerSchool Learning and Schoology is nicer for me just because it does some grading. And eventually it will go into the gradebook once they teach elementary how to use the gradebook. And it's a quick way for me to check it." Participant C also stated how the feedback is helpful for students as well:

> Of course, a quick rating for me is really nice, and it is kind of for them as well. I found my kids get a little upset if I don't give them like two practices on something. If it's only one, they're like well I got it wrong. I don't know how to get it right now. Like oh, are you just changing it to change it, or are you really learning? So sometimes it does give them that second opportunity or that third opportunity to try it again because it's not a grade for the grade book or it is practice right?

Participant C also reflected on how she uses the 1:1 Chromebooks to allow the students to self-evaluate after completing a math center activity on their Chromebooks:

> Then they'll have a math center on the Chromebook and that center has a video and then it has an activity and then it has two pieces to evaluate. One is a self-evaluation for me to see kind of if they got the lesson and then there's another one that is a self-evaluation where it might say to them, how do you feel about multiplying with three? The first choice is always I need help. Second choice is I can do it myself. The third choice is I could teach a friend. So just so they can learn to start to think about their thinking.

Participant B reflected on how she uses Kahoot to be able to see feedback for student learning. She said, "We use Kahoot a lot too, as a kind of end of the lesson review or to kind of get them more engaged. And then it's nice that I am able to see if they are actually able to do some feedback." Participant B also stated, "In Istation they can record and you can hear them. And be doing like, you know, how in old times we used to do it with paper where you will be like marking the ones that they got the errors and everything. This they just put in the computer. So it's way better. So when I get home, I can listen to them and I can see how they're doing with the reading if I didn't get a chance to hear them reading their regular book. So that's a great thing." Participant A also stated how during COVID the Chromebooks allowed for feedback to be provided still in a remote environment saying, "I was still able to give them feedback and see what their work was by being able to use the 1:1."

All four participants also mentioned a strength of utilizing the 1:1 Chromebooks was the ability to allow for differentiation for student learning. Participant C stated,

One of the strengths is it does give them that other way to see a lesson, because years ago, it was just the teacher. And then it was practice, and then there was the teacher or maybe group. This does give them another way to see it. So it might not be the exact way, It might not be a video of me. It might be a video I found that mirrors. It might be like our math videos. So it's somebody else showing them the skill. They show the skill a little differently. I might purposefully give them two or three ways to see a math skill just because it gives them that choice

to be like, oh I get this way but don't get that way. So I think that's a strength,

definitely a way for them to see things a little bit differently and to reinforce it.

Participant C also reflected on how she uses virtual field trips or labs stating, "The virtual

field trips, things like that are awesome, because again, it gives them that other insight

that I can't always give." Participant B also said, "The good thing is that Maravillas,

actually all of them, you can actually assign them lessons based on what skills or

something that I feel that they need more practice with. So I like it because not only they

can play the regular tailored activities that they have gotten from the program, but also

something that I have assigned as well. I can assign individually based on what I feel that

my kids need." She went on to reflect on a current student she has:

> I have a student that came in with no school experience at all, no preschool and no
>
> kindergarten. So it was interesting. So for him, what I've been doing is obviously,
>
> I'm not going to give him something for first grade because it will be way too
>
> much for him. So I've been giving him activities that are more like kindergarten
>
> level, but now he's getting there so soon I'm hoping to be able to give him what's
>
> for his actual grade level. It's more tailored to what they need.

Participant A also stated how the digital curriculum can allow for differentiation. She

said, "When you have nonreaders and there are components of the curriculum where they

can listen to something online rather than always have to read." Participant D stated how

a specific program they use allows for student differentiation; however, she reflected on

the difficulty of this as well. She stated, "So we have a program called iReady that does

similar to the Map thing, where it will do automatically leveled lessons that the kids

could go through. So we'll use those for a center if they can log themselves in. Most of them can't. If they could that would be great."

All participants expressed in some way how the technology can be fun or engaging for the students. Participant A stated that they use "a lot more learning game types, incorporating some of that into more a fun play" and how the use of games like Kahoot are "more engaging." She also explained how she uses Book Creator or Google slides to allow students to create because "that gives them a little bit more investment into what we're doing because it kind of seems like a fun thing for them to make." She reiterated how students "want to be making something and doing something all the time." Participant D stated how it can be engaging but reiterated how it cannot be the only tool. She stated, "So I kind of use it like in the old days when we would put in a CD or a tape and listen to a book on tape 100 times over and over and over. That's how we use it. It's good for their phonemic awareness. It's good for their confidence. It's a good exposure, but it's not going to teach them how to decode.

This theme gives insight into the strengths these participants believe the use of 1:1 Chromebooks provide. Participants expressed the different strengths they perceive and explained how that strength supports learning in their classroom. These specific strengths including student independence and ownership, student differentiation, feedback and fun provide results that are necessary to answer the research question of this study.

Theme 4: Challenges of Utilizing 1:1 Chromebooks

Another theme that evolved from the data is the challenges of utilizing 1:1 Chromebooks. This theme also provides necessary results to this study's research

question. The results of this study found one challenge of utilizing the 1:1 Chromebooks is that this type of technology use does not address the need for hands-on learning in the early elementary classroom. Another challenge found is that this type of technology and applications are not age-appropriate for early elementary.

Two of the four participants expressed that a large challenge or concern they have with utilizing the 1:1 Chromebooks is that they feel students at this age need to be utilizing physical materials for hands-on learning and utilizing the 1:1 Chromebooks does not provide that opportunity. Participant C stated,

> I am a big believer that they have to have that print in front of them. It's hard for them to follow with the computer because they have to adjust it. It comes up one size, one size doesn't fit all, and you try to get them to adjust and make it bigger. They just move their eyes closer to the Chromebook, and then they don't always point with their finger. They try to point with their mouth, and then they're on the wrong page and then you're like, seriously, we just need to get through this. I got a half hour. Okay, let's go. So that part is tough for them because I want them to point to the word.

Participant C also discussed the need for math manipulatives and how "those manipulatives are hard to replace". Participant D also expressed how students at this early age do not learn best in a digital format. She stated,

> I feel like there's an expectation that young children learn like adults. And what I mean by that is adults, probably teenagers, some teenagers. But adults can learn independently from a textbook from a webinar. They can learn new information

that's presented to them digitally or in some non-human way. Young children we have discovered very recently don't learn that way. Something about them needing the actual human face to face contact, probably honestly, physical touch contact in order to be able to learn and assimilate new information. And so I feel like the challenge has been there's an expectation from admin curriculum writers, people who don't work with small children, that little kids can learn new information presented to them in a digital form. That's a possibility. And I actually don't think it is a possibility. I think it's fine for review, and it has a place. I'm certainly not going to throw it out, but for learning new content and for any area that a kid struggles in, it's ineffective.

Another challenge found was that the Chromebooks are not age-appropriate for early elementary learners. Participant A and D expressed that the digital tools and specifically the Chromebooks are not an appropriate device for the early elementary students. Participant A said, "It's very time consuming. There's not a lot out there, especially for primary. If you want it, you have to create it. And I think part of it is that the tools in particular, the ones that we use, like, are not very kid friendly. So, you know, there's only so much you can make on Google, like slides and manipulating thing. She also stated how the Chromebooks specifically are not the best device for students:

I wish we had touchscreen like Chromebooks, so that was part of it, too. I think the biggest challenge is that the technology the school is using and the privacy and all that it isn't quite caught up to I think the level of programming I guess that would be appropriate. I would think for primary kids, I like that they use

Chromebooks, but I have nieces and nephews that use iPads, and there is a benefit to that. They can draw with their finger and they can record themselves. I feel like that for us here that's missing with using the Chromebooks.

Participant D also explained how prior to going 1:1 with the Chromebooks, there was a cart with iPads for the classroom that she felt was more effective than the Chromebooks.

When we started with one to one, kindergarten had iPads, and so those were usually the first independent work center that I gave the kids because they didn't need any instructions. So I would not open my library for about two and a half weeks because they had to learn how to manage books. But I didn't have to give any instructions for how to handle an iPad, so I could just preload it with stuff and give it to them. So that was usually the first center that they had where we started building stamina for them to work independently. So the iPads were good for that. And they also had a little bit of small motor skill with those as well. Chromebooks were very different, though. The way our district uses Chromebooks is very curriculum based, and so I found it very difficult for the students to use independently. They needed a lot of adult support and adult supervision. The logins were not kid friendly because they have control shifts that they have to do. And you don't know your numbers and letters yet you can't log yourself in. So I actually found that Chromebooks they were a lot more work for me as a teacher and didn't give the kids enough skill or content at that age as much as other activities that I could do in the same amount of time. So I kind of found them to be not very effective in the learning process for kids that little.

Participant D also expressed the challenge of students being able to login to the Chromebooks and how it is almost useless at the kindergarten level:

So Chromebooks have actually been a struggle to make them useful and appropriate in our day and in kindergarten, with the limitations of what sites we are allowed to use and how we are allowed to use it, they're almost useless. I found in first grade because the kids can read and navigate enough that they can tell the difference between password and user name. They can log themselves in. They can navigate some things. After I've shown them a few times, they are communicating and collaborating better. They can help each other. They're much more useful for review. But in kindergarten I found them to be almost useless.

A discrepant case was noted in regards to challenges in utilizing the 1:1 Chromebooks.Participant B did not express the same challenges as the other participants but expressed that one challenge is the internet. She expressed how if the internet happens to go out at school "that's out of our control", but she also explained that students not having access to internet at home is a challenge when she wants to assign digital homework activities. She also expressed a challenge with students not charging their Chromebooks at home. She went on to say though that "those are easy fixable things."

Summary

The participants in this basic qualitative study helped answer the research question of this study and provide insight into their perceptions on the strengths and challenges of utilizing 1:1 Chromebooks in the early elementary classroom. Four themes

emerged from the data analysis: learning in the early elementary classroom, technology use, strengths of utilizing 1:1 Chromebooks, and challenges of utilizing 1:1 Chromebooks. The following subthemes also emerged: content knowledge, pedagogical knowledge, 21st-century skills, COVID-19 impact, student-centered learning, and changes over time. These themes and subthemes are all important in answering the research question. Learning in the classroom and technology use, along with the subthemes provide insight into where teachers are within the TPACK framework used within this study. The strengths and challenges themes provide direct answers to the research question.

Results from this study indicated that teachers in the early elementary classrooms believe it is important for students to learn through the use of hands-on learning; however, they find the Chromebooks provide an opportunity for students to build independence and ownership in their learning. Participants expressed utilizing Chromebooks during center activities to allow students time to review or practice what they have been learning. Participants expressed these strengths of the 1:1 Chromebooks, but they also identified challenges. Participants expressed that the Chromebook and digital tools currently approved for the district are not age-appropriate for the early elementary classroom and require the teacher to create activities that are appropriate.

In this chapter, I explained the setting and participant demographics of this study. The data collection process utilized and the process used to analyze the data was explained. This included a description of the codes, categories and themes found within the analysis and the process used to determine them. Issues of trustworthiness were

provided including credibility, transferability, dependability and confirmability addressed throughout the study. The results of the analyses were detailed, including specific participant responses and quotes, along with any discrepant cases. In Chapter 5, I will identify the interpretation of the findings, limitations of the study, recommendations and social change implications of the study.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this basic qualitative study was to investigate how Midwestern public school early elementary teachers perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills. In order to accomplish this, the research question asked was how do public school early elementary teachers in a Midwest region perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills?

The basic qualitative method was used to gain insight into the perceptions of early elementary teachers. The implementation of 1:1 technology devices in school districts is increasing (Heath, 2017). Little is known about the perceptions of early elementary teachers on the strengths and challenges of utilizing 1:1 technology in their classrooms. Four early elementary teachers participated in individual Zoom interviews to explain their experiences and perceptions about the use of 1:1 Chromebooks in their classrooms.

The findings from the research question included the following themes: learning in the early elementary classroom, technology use in the classroom, strengths of utilizing 1:1 Chromebooks, and challenges of utilizing 1:1 Chromebooks. Each of these themes contained subthemes that further explore the theme. Under learning in the early elementary classroom, subthemes included the teachers' perceptions of content knowledge, pedagogical knowledge and 21st-century skills. These subthemes are in alignment with the TPACK framework that was the driving force of this study. Within the theme of technology use for student learning, the following subthemes emerged: COVID-19 impact, student-centered learning, and changes over time. The strengths and

challenges of utilizing the 1:1 Chromebooks did not contain separate subthemes. An interpretation of the findings, including study limitations, recommendations, implications and final conclusions will be explained in the rest of this chapter.

Interpretations of Findings

The interpretation of the findings of this study that emerged from the data analysis consists of four themes that align with the TPACK framework (Koehler & Mishra, 2005) and the empirical literature discussed in Chapter 2 and that answered the research question of this study. The findings consisted of early elementary teachers' beliefs about how their students learn best and what content is important for students to be learning at that age. The findings also included how teachers utilize 1:1 Chromebooks for learning in their classrooms and the strengths and challenges associated with use. The four themes and six subthemes and their relation to the framework and research question will be discussed in the interpretation of the findings, to show ways the findings confirm, disconfirm, or extend knowledge in the discipline by comparing what has been found in the empirical literature discussed in Chapter 2.

Findings Related to Conceptual Framework

The TPACK framework was used as a lens for this study. Koehler and Mishra's (2005) TPACK framework explores how teachers understanding of content, pedagogy, and technology work together in the classroom for student learning. This framework is a guideline for how teachers purposefully can integrate technology into their teaching (Kul et al., 2019). As stated in Chapter 2, 1:1 technology programs have been implemented

primarily at the secondary level but are increasingly used at the elementary level now (Cochrane, 2020).

Lawrence et al. (2018) found that in order to effectively utilize digital tools in the classroom a shift in pedagogy is necessary. It was important in this study to gain an understanding of early elementary teachers' current pedagogical and content beliefs to see how technology is connecting with those views. The theme of learning in the early elementary classroom emerged from the data analysis based on this concept.

Findings in this theme of learning in the early elementary classroom, including the subthemes of content knowledge and pedagogical knowledge, reiterate the findings of Danniels et al. (2020) that curriculum and pedagogy in early education is focused primarily on play-based learning. All four of the participants in this study expressed the need for hands-on learning through the use of manipulatives and interactive exploration. The need for experimentation and immediate feedback was reflected as a common pedagogical belief of learning for students in the early elementary classroom. This supports the research by Ihmeideh and Al-Maadadi (2018) that found that although technology should be utilized in the early elementary classroom, it does not mean that hands-on exploration and learning should not continue to occur.

Findings in this study also express that early elementary teachers believe it is most important for students at this age to learn how to read (Koorneef et al., 2019). All four participants discussed the importance of students learning the basic foundational skills of reading, writing, and math. Although all participants expressed this as the necessary learning in the early elementary classroom, research by Anangun (2018)

suggested that schools need to shift from focusing on basic literacy skills to incorporating 21st-century skills in the learning process.

The subtheme of 21st-century learning also emerged within the theme of learning in the early elementary classroom. Although participants did not mention 21st-century skills as an important learning area for students, they were specifically asked what 21st-century skills they feel are important for students at this age to learn. Participants A and C focused on basic technical skills such as logging in and basic navigation as the necessary 21st-century skills appropriate for this age. Participants B and D did not reference any technology in their response to the necessary 21st-century skills. Participant D expressed skills such as collaboration, communication, and sharing as the necessary 21st-century skills. These responses support the research that today's students need to learn skills such as digital literacy, communication, creativity and collaboration (Varier et al., 2017). This is also in alignment with research stating elementary students need to develop a sense of digital citizenship (Johnston et al., 2018). Although two participants only stated technical skills as necessary 21st-century skills and only Participant B stated student independence, all participants mentioned student independence, self-centered learning, and student creativity throughout their explanations of their experiences using technology. This is an indication that these participants are incorporating 21st-century skills that they believe are important elements of their pedagogy of student learning.

Another theme that emerged from the data analysis was technology use in the early elementary classroom, along with the subthemes of COVID-19 impact, student-

centered learning, and changes over time. Research by Parrish and Sadera (2020) found that 1:1 initiatives can be effective when the teacher's pedagogy is focused on how to effectively utilize technology within a student-centered learning approach. Researchers have also found that 1:1 technology devices can provide opportunities for student-centered learning in classrooms that allow for collaborative and differentiated activities (Aitken, 2017; Varier et al., 2017). The findings of this study support this as three of the four participants reflected on using the 1:1 devices through centers in the classroom as found in the student-centered learning subtheme. Participants B and C elaborated on how they incorporate digital and hands-on centers to allow students multiple experiences. They utilize technology as a review of their skills or as a way to pre-teach. This aligns with Danniels et al.'s (2020) research that expressed the need for teachers at the early elementary level to incorporate play-based activities and technology-based activities together. These findings also support research by An and Mindrilla (2020) that found teachers with a learner-centered pedagogy incorporate different technology tools and strategies to build student independence and collaboration.

The use of different digital tools such as Google activities and the various digital curriculum platforms support how teachers are utilizing technology to help their students in the learning process. Although two of the participants did reiterate the need for students to have physical books in their hands to read, all four participants mentioned their students using the 1:1 Chromebooks to read books. This supports Koorneef et al.'s (2019) statement that, in this digital age, reading stories in a paper format are not the norm anymore and that digital texts can provide different options that can benefit

beginning readers. All participants also expressed that their use of technology activities consisted of review, extra practice, or pre-teaching. Participant D specifically reflected on how she felt technology cannot be used to teach students new material. Participants A, B, and C mentioned using technology for students to create or experience the learning material in a different way. However, based on their explanations of use, the technology seems to be used more so for review and application of learning. This aligns with research that 1:1 technology initiatives at the early elementary level are going to look different than in upper grades and may require more lower-level applications (Magen-Nargar & Firstater, 2019).

Findings in this theme also related to the subtheme of COVID-19 impact on student learning. The COVID-19 pandemic hit the United States in the beginning of 2020 and students were no longer allowed to attend school face-to-face, forcing schools to instruct students in a remote environment (Ghazali, 2020; Morgan, 2020). All four of the participants brought up the pandemic and how the 1:1 Chromebooks allowed for instruction to still occur. Participants A, B, and C all expressed that students having 1:1 devices allowed the students to still communicate with each other and digital tools allowed them to see how students were learning. Although Participant D stated she utilized the digital curriculum and google activities during this time, she reiterated that teaching with digital books and tools was not effective for student learning. This supports Summers's (2020) research that effective learning does not occur just because a school district finds a way to provide students access to devices.

The subtheme of changes over time also show that participants' use of technology has changed over the years due to the 1:1 technology. Participant A reflected on how the students' technology ability has grown over the years and that she can expect more of them when utilizing the Chromebooks. Students are becoming increasingly exposed to technology in their personal lives and are now "digital natives" in the classroom (Dinc, 2019; Johnson, 2020; Sabiril & Coklar, 2020). The use of 1:1 Chromebooks has allowed the participants to utilize them more frequently in the classroom and the students' knowledge base of technology use has grown over the years, allowing students to be more independent in their learning with the use of the 1:1 Chromebooks.

Findings Related to the Research Question

This study was seeking to answer the research question: How do public school early elementary teachers in a Midwest region perceive the strengths and challenges of using 1:1 technology as instructional tools to help K-3 students acquire 21st-century skills? Two themes emerged from the data analysis that focuses on the strengths and the challenges of utilizing 1:1 Chromebooks in the early elementary classroom.

The findings of this study identified the following strengths of utilizing the 1:1 Chromebooks in the early elementary classroom: student independence and ownership, student differentiation, feedback and fun. In this study, three of the four participants found that the use of 1:1 Chromebooks in the classroom helps build student independence and ownership in their learning. This is an important shift in teacher pedagogy and building 21st-century learning skills for students in today's classroom (Yelland, 2018).

Another strength of 1:1 Chromebook use identified in this study was the ability to differentiate activities or lessons based on students' needs or type of learning. All participants in this study described experiences utilizing the 1:1 Chromebooks in a way to differentiate learning for students. According to research by Hallman (2019), 1:1 technology initiatives are most associated with a personalized learning pedagogy. This aligns with all of the participants' expressed beliefs that students learn best when presented material in different ways that relate to the different learning styles of the student. Research by An and Mindrilla (2020) supports the theory that when teachers have a learner-centered pedagogy, they are more likely to incorporate different technology tools and strategies to allow for student-centered learning that meets the student's own learning needs at their own pace. Yelland (2018) found similar research stating that technology use at the early elementary level allows teachers to meet the individualized learning needs of students and incorporate different multimodal learning strategies. The 1:1 Chromebooks provide opportunities for students to learn in a way that best meets their specific needs.

Providing instant feedback for students was another strength identified by three of the four participants. The participants mentioned utilizing instant feedback as a means of quickly being able to see student progress. Christopoulos et al. (2020) found similar research showing how technology programs may allow teachers the ability to easily track student progress to determine what students may need more support. Participants also elaborated on how instant feedback with the use of technology is motivating and helpful for the students. Participant B explained how students use instant feedback as a motivator

in the learning process. The teacher provides students with the opportunity to utilize multiple attempts so the students can learn how to correct their answers. This aligns with Kurviven et al.'s (2020) findings that students to be more motivated in their learning when they were provided with instant feedback and able to try something again after learning their mistakes.

Another strength of utilizing the 1:1 Chromebooks was its ability to make learning fun for the students. Several studies have found that the use of technology can provide an increase in student engagement and motivation in the learning process (Chen et al., 2018; Harris et al., 2016; Lou & Murray, 2018; Sbiril & Coklar, 2020). Although each participant mentioned how they may utilize the 1:1 Chromebooks for something fun for the students, this was not mentioned as often throughout the interviews. Participants A and B explained they use learning games that can make things more engaging for students; however, participants also expressed some frustrations with the technology that may have impacted their perspectives about engagement for early elementary students. These frustrations will be addressed in the next section related to challenges found with utilizing the 1:1 Chromebooks.

These different strengths mentioned by all of the participants seem to intersect together. The participants utilize the 1:1 devices as a way to individualize student learning and differentiate. This process builds student independence and ownership in their learning allowing the use of instant feedback to increase the engagement of the activity. This aligns with research by Christopoulous et al. (2020), who found that students were more motivated to utilize technology because it enabled them to see their

progress, gain feedback, and be a part of their own learning process. Neokleous (2019) also found that students were more engaged in learning because they could be more independent. The utilization of the 1:1 Chromebooks in the early elementary classroom allows an opportunity for teachers to differentiate their learning based on the needs of the students and providing instant feedback and building student ownership in their learning.

Research has suggested that although there may be benefits to utilizing technology in the classroom, if they are used in an ineffective manner, there may be several challenges associated with the use of the 1:1 technology devices (Luo & Murray, 2018). This study was seeking to find the challenges along with the strengths that early elementary teachers perceive to be associated with the use of 1:1 Chromebooks. The challenges of utilizing 1:1 Chromebooks for student learning identified in this study included that this technology does not address the need for hands-on learning and that it is not age-appropriate for early elementary learners.

One common challenge identified by three of the four participants was the pedagogical belief that is more important for students to be utilizing hands-on learning, than utilizing the Chromebooks for learning. This finding supports research found by Magen-Nargar and Firstater (2019) where kindergarten teachers expressed the belief that students need to develop their skills through hands-on play that they are not always able to do with technology. Both Participants C and D expressed how they may use the Chromebooks for review or independent practice but they both expressed that students cannot learn new content utilizing the Chromebook. Participant C explained how she believes students need to be able to point to a word or sound when trying to learn to read

and expressed how this is difficult for students to do on the Chromebook. Participant D

expressed her feelings that there is a district expectation that students can and should be

learning digitally. This directly aligns with the perceptions of elementary teachers in a

study by Urbina and Polly (2017) who felt there was a district expectation that students

and teachers should always be utilizing technology in the classroom, even if it is not the

best tool for learning that specific skill.

Another challenge found in the data was that digital tools and the Chromebook

specifically were not age-appropriate for early elementary learners. Three of the four

participants expressed their frustrations with the digital tools available for students. These

participants discussed how the district-approved digital websites and programs are not

kid-friendly and age-appropriate for the early elementary learners. Participant A

explained how she needs to create many things on her own to use with her students

because the available tools are not kid-friendly. Participants A and D both expressed how

they wish the students had iPads instead of Chromebooks. This aligns with research by

Vu et al. (2019) that found that elementary teachers preferred to have iPads in 1:1

technology initiatives, but secondary preferred Chromebooks. Participant A explained

how using a tablet device like an iPad would allow students to draw with their fingers.

Bonneton-Botte et al. (2020) found that utilizing tablets in a kindergarten classroom was

beneficial in helping students develop their motor learning and handwriting skills.

Participant D also explained how the district used to utilize iPads in the classroom and

she found it to be more beneficial. She expressed that at the kindergarten level,

Chromebooks are difficult for students to utilize independently. She explained how

logging on the Chromebooks is a challenge because students have to type in a password utilizing a capital letter when students at this age might not know their numbers or letters yet. She explained that in first grade students are better able to login and navigate on the Chromebooks but she feels at the kindergarten level it is "almost useless."

Limitations of the Findings

Limitations of this study included the transferability of the study due to the small sample size and population. The participant sample size was less than anticipated impacting the transferability and generalizability of the results even more. Another limitation was the variance in learning between students in K-3 students. This grade level band is considered early elementary and was included in this study; however, students at a kindergarten level may learn very differently compared to students at the third grade level. The level of technical ability of students may also vary strongly between these grade levels which may impact the perceptions of teachers at the different grade levels. Another limitation was my own role within the district of the study participants. As the elementary school district's digital learning coach, participants' views and perceptions of me may be impacted. Throughout the data collection and analysis process, I continued to check that my own personal biases or beliefs were not influencing the data.

Recommendations

In this study, the perceptions on the strengths and challenges of utilizing 1:1 Chromebooks was explored specifically in the early elementary classrooms. Recommendations for future research could include focusing specifically on the different types of 1:1 devices that could be utilized in a 1:1 environment to determine what devices

could provide different impacts for early elementary learners. Future research could also explore the student perceptions or experiences of utilizing 1:1 technology. Although this would involve research of children participants, it could be valuable to see what students believe would be helpful in utilizing the 1:1 technology and the experiences they have. This study incorporated teachers from grades K-3; however, there was only one teacher from each of those grade levels. It may be beneficial for future research to look deeper into each grade level specifically as features of the technology used at the kindergarten level may look different than at a third grade level.

Other studies have explored different technology strategies and programs. Additional research could be done on the specific digital curriculum or programs that are utilized at the early elementary level. Participants in this study mentioned that they felt the digital tools and programs did not always support the early elementary learners. Further research could be done to determine the different programs that may or may not be beneficial at the early elementary level.

Implications

The findings of this study explored the experiences of early elementary teachers who have utilized 1:1 Chromebooks in their classrooms. Their perceptions on the strengths and challenges of utilizing 1:1 technology in an early elementary classroom indicate ways technology can support learning, but also how technology can support teacher's pedagogy. Findings of this study reiterate Gherardi's (2017) study that found that teachers' beliefs in what and how students learn strongly correlate to their views of 1:1 learning.

The findings of this study may provide implications for social change for early elementary school teachers by providing insight into the struggles and experiences early elementary teachers have incorporating 1:1 Chromebooks into their classrooms. The results of this study may also provide implications for positive social change for district stakeholders by providing information that can help when initiating a 1:1 technology implementation within school classrooms. This can provide information on the training and support teachers may need in not only understanding how to use the technology, but how to effectively incorporate technology into their current pedagogy and content in the classroom to support 21st-century learning (Chai et al., 2019). If district administration are able to provide the appropriate and necessary support and training to teachers in technology usage for learning in the early elementary classroom, the implementation of 1:1 technology in the classrooms may be more effective and beneficial to student learning.

Conclusion

This basic qualitative study was conducted to investigate the perceptions of early elementary teachers on the strengths and challenges of utilizing 1:1 technology in the classroom. The findings of this study show that 1:1 Chromebooks can be utilized in the early elementary classrooms to build student independence and ownership in the learning process; however, at the early elementary level, there are not as many digital applications that are age-appropriate. Although the transferability of the findings of this study may be limited due to the small sample size, the findings of this study relate to the current research regarding technology use and a need for understanding how pedagogy, content,

and technology can work together (Koehler & Mishra, 2005). As districts make decisions about utilizing 1:1 technology, specifically at the early elementary level, they need to consider the type of device that is most appropriate for students at this age, the programs and tools that will be utilized for these students, and how to train teachers in utilizing the technology to best support their pedagogy and content.

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Appendix: Interview Questions

Interview Questions (IQ)

IQ #1: What skills and content do you believe is important for students at this age to learn?

IQ #2: How do you think students at this age learn best?

IQ #3: What 21st-century skills do you believe are important for students at this age to learn?

IQ #4: Tell me the role the 1:1 devices play in your classroom.

IQ #5: What ways have you utilized the Chromebooks to support student growth in math in your classroom?

IQ #6: What ways have you utilized the Chromebooks to support student growth in reading and writing in your classroom?

IQ #7: Tell me about an experience you found to be successful with using the 1:1 Chromebooks in your classroom?

IQ #8: What have you found to be a strength in using the 1:1 Chromebooks to help support instruction in the classroom?

IQ #9: What have you found to be a challenge with using the 1:1 Chromebooks to support instruction in the classroom?

IQ #10: Tell me about an experience you found to be challenging or frustrating when the 1:1 Chromebooks in your classroom.

IQ #11: How has your use of the 1:1 Chromebooks in the classroom changed over time?