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Abstract

Teachers are facing the challenge of implementing division and school-level technology integration practices while meeting the needs of all students. This qualitative research study sought to discover how teacher technology self-efficacy influences computer-assisted instruction in urban elementary schools in Virginia. The Technology Proficiency Self-Assessment (TPSA) questionnaire was administered to certified core-content teachers at sixteen urban elementary school sites in Virginia in order to gauge teachers' current level of technology self-efficacy. Three self-efficacy groups were formed based on data collected from the questionnaire: low-to-medium, medium-to-high, and very high. From that population, purposive sampling was used to determine the participants for the case study. Twenty teachers with varying levels of technology self-efficacy were selected. The researcher conducted face-to-face interviews with ten teachers and the remaining ten teachers participated in one of two focus groups to gain a better understanding of how self-efficacy levels, resources, and professional development impact computer-assisted instructional practices. After manual and software coding, the data was analyzed in reference to the research question. Results revealed internal and external factors that influenced teachers' technology self-efficacy, including personal, behavioral, and environmental factors. The finding also indicated more can be done to support increased technology self-efficacy in teachers, which may increase computer-assisted instruction and student achievement in urban elementary schools.

Keywords: teacher self-efficacy, computer-assisted instruction, technology integration, 21st-century learning, technological pedagogical content knowledge, instructional technology

Dedication

This dissertation is dedicated to the people who have endured this journey with me, especially my wife and children. This is for you, Kesha, Loni, Christian, and Cameron. I would like to thank my parents for the solid foundation you have always provided. I would not be who I am today without Frank and Pam. I hope that the strength, patience, confidence, and fortitude that I have demonstrated throughout this journey will encourage you all to reach higher the highest star to accomplish your goals. Thank you for your continued love and support!

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Thank you to my wife Kesha Johnson for being my biggest cheerleader and support mechanism throughout this journey. You never lost your smile or patience. Even when I felt like it was all crashing down, your “You got this!” meant it all. Thank you to my kids for letting dad slip away right before bedtime to work. Thank you for understanding dad’s task and supporting me. Thank you to all my friends and coworkers. Thank you, Dr. Graham. You are absolutely amazing and have helped me through to the very end. I could not have completed this prodigious task without all of you. Love you!

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Chapter 1: Introduction

Introduction to the Problem

The use of technology in the classroom is more important today than ever. Students are arriving in classrooms with high levels of digital knowledge and confidence using computers as well as other forms of technology. Nevertheless, they are often forced to disconnect, unplug, and turn off their devices when class begins. Teachers are facing the challenge of implementing division and school-level technology integration practices while meeting the needs of all students. While many schools focus on the availability of technology, research shows that teacher inexperience, poor planning, and the lack of time for implementation are the greatest factors in unsuccessful technology integration. This qualitative study explored the influence of teacher technology self-efficacy on the use of computer-assisted instruction (CAI) at the elementary level. Bandura's (1994) theory served as the theoretical framework for this study. Bandura's social cognitive theory describes a direct connection between people, environment, and behaviors as they pertain to learning.

In this study, the intention of the design was to explore the influence of teacher self-efficacy and the use of technology in urban elementary classrooms. Bandura (1977) described self-efficacy as perceptions or beliefs in the ability to succeed in specific educational related tasks. Based on Bandura's studies, Denham and Michael (1981) presented a model that described self-efficacy as the connection between effective instruction and student achievement. This study focused on teachers' perceptions of their ability to successfully utilize instructional technology and software. Creswell (2013) explained that the case study design is an effective method of understating what people are thinking, feeling, and believing at any particular time. Previous research in the area of teacher self-efficacy focused on teacher confidence, behavior

management, and retention (Heath, 2017; Li, Worch, Zhou, & Aguiton, 2015; Shifflet & Weilbacher, 2015; Yerdelen-Damar, Boz, & Aydın-Günbatar, 2017). This case study explored teacher perceptions of their ability to effectively use CAI in the classroom while building upon prior research in the area of teacher self-efficacy. Research on teacher technology self-efficacy suggests that teachers with high self-efficacy are more likely to engage in innovative instructional practices (Kao, Chin-Chung, & Shih, 2014; Wang, Hsu, Campbell, Coster, & Longhurst, 2014).

Background, Context, History, and Conceptual Framework for the Problem

Increasing the use of technology in the classroom has been a focal point of several studies over the past decade (Ghareb & Mohammed, 2017; Kim, Baylen, Leh, & Lin, 2015; Murray & Rabiner, 2014). Billions of federal, state, and local dollars have been used to invest in classroom technology in efforts to improve student academic achievement (U.S. Department of Education, 2017). Nevertheless, students in many classrooms, particularly those in low-income urban communities, are not experiencing growth at significant levels to close the achievement gap (Leu, Forzani, & Kennedy, 2015; Plucker & Peters, 2018). Teachers are a critical element in integrating technology into classrooms. Without proper planning and training, keeping up with advancements in technology and effective integration models can be challenging (Coleman, Gibson, Cotten, Howell-Moroney, & Stringer, 2016).

School divisions across the country are moving in the right direction by supporting technology education. In urban divisions throughout the country, schools have traditionally restricted the use of cell phones and tablets (Hernan, Collins, Morrison, & Kroeger, 2018). Although, over the past decade an increasing number of schools have adopted bring your own device policies and student safe web browsers (Hynes & Younie, 2017). As initiatives increase

and resources improve, students rely on trained teachers who are confident in using technology as an educational asset (Harris & Hofer, 2017). Teachers and students benefit from improved practices and alternative learning strategies when technology is used consistently in the classroom (Kim, Kim, Lee, Spector, & DeMeester, 2013). Eisenman, Edwards, and Cushman (2015) and Papanikolaou, Makri, and Roussos (2017) identified ineffective training, teacher turnover, and inconsistent resources as factors that influence ineffective instructional technology practices. This study explored three reoccurring areas of focus found in the review of the relevant literature—teacher self-efficacy, instructional technology training, and increasing technology integration in elementary schools.

Past studies found that properly implemented technology integration can significantly increase student achievement and promote active engagement in at-risk students (Collins & Halverson, 2018; Darling-Hammond, Zielezinski, & Goldman, 2014; Hilton, 2016; Kim et al., 2013). Moreover, studies highlighted the advantages of using technology as an instructional tool rather than a supplemental resource (Alaniz & Wilson, 2015; Bulman & Fairlie, 2016; Eady & Lockyer, 2013; Ghareb & Mohammed, 2017; Hwang, Lai, & Wang, 2015; Rose, Carter, Brown, & Shumway, 2017). School division leaders have increased efforts to build professional development around technological, pedagogical, and content knowledge (TPACK; Harris & Hofer, 2017; Koh, Chai, & Lee, 2015)).

Statement of the Problem

The problem this study explored was teacher technology self-efficacy and how it influences computer-assisted instruction in urban elementary schools. In the National Education Technology Plan update "Future ready learning: Reimagining the role of technology in education," the U.S. Department of Education (2017) expressed a greater need for preparing

teachers for technology instruction prior to arriving in the classroom. Several studies found that school divisions are experiencing difficulties finding teachers who can select digital resources and tools that support state standards and student achievement (McKnight et al., 2016; Will, 2016; Zipke, 2017). This is problematic due to research and data reports from the U.S. Department of Education (2017) and the National Assessment of Educational Progress (NAEP) that show urban elementary schools are continuing to underperform on standardized tests.

Research has shown that teacher effectiveness is the most important factor in student achievement (Ansari & Malik, 2013; Goldhaber, Krieg, & Theobald, 2017; Hanushek, 2016; Klassen & Tze, 2014). Likewise, previous studies have shown that some teachers are far more confident in their ability to use technology in the classroom than others (Lemon & Garvis, 2016; Li et al., 2015; Pfitzner-Eden, 2016). Examining the beliefs, perceptions, and practices of teachers could provide a much deeper understanding of teacher technology self-efficacy and improving computer-assisted instruction in urban elementary schools.

Purpose of the Study

The purpose of this qualitative case study was to explore teacher technology self-efficacy and how it influences computer-assisted instruction in urban elementary schools in Virginia. The goal of this case study was to explore teacher perceptions associated with using technology as an instructional tool. This case study will be an asset for teachers and division officials looking to gain a better understanding of how teachers perceive CAI as well as what training is needed to increase teacher technology self-efficacy. Several reports released by the United States Department of Education indicated gaps in core content areas between urban and suburban elementary schools (U.S. Department of Education, 2017). Past studies have shown that technology-supported instruction is an effective method of closing academic achievement gaps

between at-risk students and their peers (Adebisi, Liman, & Longpoe, 2015; Darling-Hammond et al., 2014; Murray & Rabiner, 2014). Continued research in the area of teacher self-efficacy revealed factors influence teacher confidence in using technology in the classroom. Limited training opportunities, resources, and time all contributed to low teacher self-efficacy in K–12 teachers.

Research Question

This study focused on teacher technology self-efficacy and its influence on computer-assisted instruction in urban elementary schools. The research question was answered using three research strategies: questionnaire responses, interviews, and focus group discussions. The following question guided the study:

RQ: How does teacher technology self-efficacy influence computer-assisted instruction in urban elementary schools in Virginia?

Rationale, Relevance, and Significance of the Study

The researcher used a qualitative approach in this study. The qualitative methodology allowed the researcher to delve deeper into the thoughts and beliefs of teachers in urban elementary classrooms tasked to use technology for instructional purposes. Baskarada (2014) believed that qualitative research is necessary when the researcher seeks to link findings from the study to theory. The process of gaining knowledge from the interactions between individuals and their surroundings is the basis of qualitative research (Creswell, 2013). During this study, the research question was used to explore the influence of teacher technology self-efficacy on computer-assisted instruction.

According to Yin (2017), the purpose of qualitative case study research is to investigate a phenomenon in its real-life context. The rationale for a focus on urban elementary school

teachers is based on the lack of reported research on the influence of teacher technology self-efficacy in this area (Kao et al., 2014; Kim et al., 2015; Tonduer, VanBrak, Ertmer, & Ottenbreit-Leftwich, 2017). Moreover, research into teacher self-efficacy has shown a need for additional research regarding technology integration, training, and computer-assisted instructional practices (Davies & West, 2014; Hofer & Harris, 2017; Williams, 2015). In this study, the researcher used a single exploratory case study to explore the influence of teacher technology self-efficacy on the use of computer-assisted instruction in urban elementary classrooms.

Research design. This qualitative research used a case study design to explore teacher technology self-efficacy and the use of computer-assisted technology in the urban elementary classroom. An exploratory case study design allowed the researcher to focus on the phenomenon of self-efficacy in the use of technology in the classroom. Case study research provides a greater opportunity to concentrate on the details and specifics necessary to fully address the phenomenon being studied (Yin, 2017).

For this single exploratory case study, 20 teachers from multiple urban elementary schools in Virginia volunteered to participate in exploring the influence of teacher technology self-efficacy on the use of computer-assisted instruction. With the assistance of division elementary school principals and the department of technology and communication, the researcher distributed the Technology Proficiency Self-Assessment (TPSA) via email to eligible teachers. The email contained an explanation of the study, a consent form, and a link to the online questionnaire. For this study, all first through fifth-grade core content teachers (English, mathematics, history, and science) who had access to computers or digital technology in the classroom (DTC) were eligible participants. The questionnaire was set to be active for two

weeks. During this time, teachers had access to the 20-question TPSA questionnaire. After two weeks, the researcher closed the questionnaire and analyzed the recorded information.

Following the initial questionnaire, the researcher grouped the participants using purposive sampling. Participants were arranged in low, medium, or high technology self-efficacy groups according to their TPSA results. One week after the TPSA questionnaire, semistructured interviews were conducted with 10 of the participants. The personal interviews allowed the researcher to gather more precise information on the personal beliefs and perceptions of technology instruction and professional development. After all personal interviews concluded, the researcher scheduled two focus group sessions with the remaining 10 participants. The focus groups gave participants with varying levels of technology self-efficacy the ability to discuss their thoughts, beliefs, wants, and needs in the area of CAI and TPACK training. All interviews and focus group conversations were recorded and transcribed. By design, data collection and analysis were an ongoing, simultaneous process in this study (Creswell, 2013).

Definition of Terms

Computer-assisted instruction (CAI). A method of instruction or remediation where learners interact with computers or other forms of media to achieve educational objectives (Kim, McKenna, & Park, 2017).

Digital technologies in the classroom (DTC). Digital processing systems that encourage active learning, knowledge construction, inquiry, and exploration on the part of the learners, and which allow for remote communication as well as data sharing to take place between teachers and/ or learners in different physical classroom locations (Cambridge IGCSE, 2017).

Self-efficacy. An individual's belief in his or her ability to successfully complete tasks or achieve goals (Bandura, 1997).

Standards of Learning (SOL). Established by Virginia Public Schools as the minimum expectations for students' knowledge and ability by the end of the course or year in English, mathematics, science, history, and other subjects (Virginia Department of Education, 2018b).

Teacher self-efficacy. The perception that the teacher has of his or her ability to convey knowledge and understanding as well as to influence student behavior regardless of student motivation (Tschannen-Moran & Woolfolk Hoy, 2001).

Technology integration. Technology integration is the use of technology resource—such as computers, mobile devices like smartphones and tablets, digital cameras, social media platforms and networks, software applications, and the internet—in daily classroom practices, and in the management of a school (Edutopia, 2019).

TSES. The Teacher Self-Efficacy scale, developed by Tschannen-Moran and Woolfolk Hoy (2001).

TPACK. The framework for technological pedagogical content knowledge used for technology integration in the classroom (Mishra & Koehler, 2006).

TPSA. An instrument developed to measure teacher self-efficacy and four types of technology proficiencies: using e-mail, navigating the internet, using applications, and teaching with technology (Christensen & Knezek, 2017).

Assumptions, Limitations, and Delimitations

There were assumptions, limitations, and delimitations in this study that required consideration. According to Yin (2017), assumptions are statements or beliefs that relate to the study but cannot be proven. In qualitative research, the researcher's understanding of data related to the phenomena is shaped by assumptions (Olson, 2016; Silverman, 2016). It was assumed that the teachers participating in the study provided truthful responses on the TPSA and during

interviews. Likewise, it was assumed that each school follows the division technology plan for instruction and teacher development. In addition, an assumption could be made that the exploratory case study was the best method of collecting data.

Limitations. Selecting 20 participants from the division elementary schools created a limitation in this study by presenting a small sample size (Creswell, 2013; Yin, 2017). Likewise, there were limitations related to the TPSA tool, which relied on the teachers' comprehension of the questions, willingness to complete their own questionnaire, and memory of specific experiences. Interviews and focus groups are effective methods of collecting data in qualitative research, but there are limitations associated with face-to-face and group interactions (Creswell, 2009; Nardi, 2015; Spradley, 2016). Interviews and focus groups took time to organize, conduct, and transcribe. In addition, participants needed to be available and willing to meet with the researcher in a timely manner.

Delimitations. Delimitations set the boundaries in the study and aim to narrow the scope of research (Creswell, 2013; Yin, 2017). The delimitations of the study included the small sample size of urban elementary teachers, the requirement of core content instruction, and access to computers or other forms of digital technology. This study was delimited to a single urban school division in Virginia. The original intent of the study was to have all the urban elementary schools represented in the study, however, only 16 schools had teachers respond to the invitation, complete the questionnaire, and agree to participate in the study.

Summary

Teacher technology self-efficacy is an area that has little research available for teachers, administrators, and division officials to learn methods of addressing instructional inequalities. While some students are exposed to rich, technology-supported classroom instruction, others are

feeling the effects of the digital divide due to teachers with low technology self-efficacy (Daugherty, Dossani, Johnson, & Oguz, 2014). The goal of this research was to gather more information on the beliefs, perceptions, and fears of urban elementary school teachers and the use of technology as an instructional tool.

This study consists of five chapters. Chapter 1 consists of the introduction to the study, the background to the problem, statement of the problem, research questions, the rationale for the methodology, research design, the definition of terms, and assumptions, limitations, and delimitations. Chapter 2 includes the conceptual framework, review of research literature, review of methodological issues, synthesis of research findings, and critique of previous research. Chapter 3, the research methodology, includes the introduction, research questions, research methodology, research design, population and sampling, sources of data, data collection, data analysis procedures, limitations of the research, ethical issues, and the summary. Chapter 4 outlines the findings from the research and Chapter 5 provides a summary of the findings, conclusions, and recommendations for further study.

Chapter 2: Literature Review

Introduction to the Literature Review

The purpose of this chapter is to explore teacher self-efficacy and classroom technology in relation to academic achievement in elementary school students. The social cognitive theory, developed from Bandura's earlier work on the social learning theory, suggested that the belief in one's abilities has a direct influence on their motivation and practices (Bandura, 1997). In fact, Bandura (2009) describes self-efficacy as the ability possessed by an individual that allows them to achieve goals, accomplish tasks, or succeed in a given situation. Tonduer et al. (2017) explained that a teacher's personal beliefs, motivation, and ability to manage resources play a role in his or her use of classroom technology. Research indicated that as teachers discover new tools and build trust in their ability to utilize them, their technology self-efficacy increases, allowing them to create more successful classroom learning experiences (Klassen & Tze, 2014; Leu et al., 2015).

Computer-assisted instruction and learning are key elements of a technology-driven learning environment that fosters higher levels of student achievement and builds motivation (Harandi, 2015). The use of computer-assisted instruction (CAI) fosters unique methods of content presentation that allows learners to interact with words and numbers much different from traditional written instruction (Sivaram & Ramar, 2014). In a similar manner, schools that support computer-assisted learning (CAL) models provide flexibility and more opportunities for teachers to serve all students more effectively. The emergence of learning management systems that focus on at-risk students and students with disabilities has helped facilitate inclusive learning and personalized learning experiences (Adebisi et al., 2015). Students can choose their own structure and pace of learning while using CAL in the classroom (Hudson, 2014). Moreover,

differentiated instruction and personalized learning experiences are vital to setting expectations and achievable goals for students (Adebisi et al., 2015; Hudson, 2014). With computer-assisted programs, teachers provide an opportunity for students to progress at their own speed while receiving regular feedback on their growth (Gardenhire, Diamond, Headlam, & Weiss, 2016). For this reason, experiences involving computer-assisted instruction and learning were the source of teacher self-efficacy focused on throughout this research study.

Four areas of research are explored in this review: the role of teacher self-efficacy in technology education, issues in technology instruction, motivating teachers and students to use classroom technology, and benefits and barriers to computer-assisted learning. Peer-reviewed journals, books, educational reports, and existing studies involving education and efficacy were identified as key sources. During the literature search, the parameters included search terms such as self-efficacy, childhood education, technology self-efficacy, and technology education to locate relevant text. The Concordia University digital databases, which included ProQuest, EBSCOhost, Sage, and ILLiad, were used to conduct the literature search.

Throughout the literature review, two ongoing themes were present: the growing need for elementary school technology education (ESTE) programs and the influence of effective instruction in computer-assisted learning programs. Urban elementary schools in Virginia continue to have the lowest test scores and highest rates of absenteeism and incidents of disruptive behavior (Virginia Department of Education, 2018a). Collins and Halverson (2018) expressed the need to "rethink education in the age of technology" as opposed to adopting new initiatives (p. 7). Similar to those beliefs, Ghareb and Mohammed (2017) described technology integration as a process of enhancing effective practices with new devices. Elementary schools

that have engaging technology programs see improvements in attendance, students who self-discipline, and increases in critical content areas (Pugh, Liu, & Wang, 2018).

Several studies have provided research on increasing academic achievement in elementary through college students with the use of CAI (Banerjee, 2016; Bennett, Gardner, Cartledge, Ramnath, & Council, 2017; Bulman & Fairlie, 2016; Chatterji, 2018; Colucci-Gray, Das, Gray, Robson, & Spratt, 2013). Several of those studies (Bennett et al., 2017; Bulman & Fairlie, 2016; Chatterji, 2018) found that successful CAI requires effective teachers. Simply providing computers, software, or digital resources did not positively improve student growth (Banerjee, 2016; Bennett et al., 2017; Kim et al., 2017). Properly trained teachers provide an opportunity to improve the academic and economic future of students by understanding where innovation and K – 12 education intersect (Chatterji, 2018). Rose et al. (2017) discussed teacher development as a factor in preparing teachers and students for technology-based learning experiences. Particularly in elementary schools, teachers focus on core competencies and spend little time introducing technology-based practices that support student learning (Serdyukov, 2017). The lack of effective integrated elementary school classrooms is not a representation of teacher knowledge or interest, but an indicator of the needs training and development should address (Ersoy & Bozkurt, 2017). Similar studies took a contrasting approach and focused on recruiting, hiring, and retaining teachers with technology experience (Levy, Jia, Marco-Bujosa, Gess-Newsome, & Pasquale, 2016; Tolegen et al., 2016; Zhang & Zeller, 2016).

Throughout the country, school divisions have worked to provide computers to one in every five students and are spending more than three billion dollars per year on digital content (U.S. Department of Education, 2017). The 2016 Digital Education Survey, released by Deloitte's Technology, Media & Telecommunications division, stated 98% of teachers had

access to one or more computers in their classroom. Nevertheless, Ertmer, Ottenbreit-Leftwich, and Tondeur (2015) stressed that just because there are computers in a classroom does not change the way a teacher approaches instruction. In 2015, a study found that even with the abundance of new technology in their classrooms, many teachers have not aggressively worked to make teaching with technology a priority (Herold, 2016).

While examining the influence of CAI to support learning, a pattern of inconsistent use of classroom resources as a part of the daily instruction was identified. Many students are exposed to a wide range of digital enrichment, while others experience the complete opposite in classrooms with teachers who are reluctant to use technology (Carey, 2013; Gilakjani, Lai-Mei, & Ismail, 2013; Hernan et al., 2018). In a study of K–12 teachers' attitudes towards computer use, support, and instruction, Williams (2015) found that teachers who felt uncomfortable using technology or had experienced problems with integration in the past were less likely to use technology. In addition, previous studies noted that technology integration will likely fail among teachers who lack training, have limited resources, or feel that there is not enough time (Blackwell, Lauricella, Wartella, Robb, & Schomburg, 2013; Bulman & Fairlie, 2016; Ghareb & Mohammed, 2017). However, there were limited studies focused on the role of prior knowledge and experience with computer-based instruction influences teacher technology self-efficacy and student achievement.

The review of research found a significant need for expanding teacher training related to the use of technology as a tool during classroom instruction. In recent years, many school divisions have restructured their professional development and technology integration programs to incorporate the key components of TPACK (Koh et al., 2015). A major component of teacher development is buy-in for practices that utilize nontraditional strategies and integration (Christ &

Wang, 2013). However, for TPACK to be an effective framework for instructional practices and technology learning, Herring (2016) found that positive teacher self-efficacy is needed.

Rotter's (1966) principles of locus control and Bandura's (1997) theory of self-efficacy are related to the internal and external factors that influence self-esteem and the general self-efficacy of teachers. Nevertheless, Bandura (2012) argued that self-efficacy should not be confused with self-esteem. In response to social reformers who used the words interchangeably, Bandura (2012) explained, "self-esteem and self-efficacy are entirely different constructs. Self-efficacy is a judgment of capability. Self-esteem is a judgment of self-worth" (p. 29). In some cases, teachers have high self-esteem about their worth, but when a specific task is presented, such as CAI, their confidence often waivers and causes doubt in their ability (Khan, Fleva, & Qazi, 2015). The problem, then, becomes how do schools hire and retain teachers who are comfortable working with technology in an environment that promotes digital fluency and integration during instruction.

Rotter (1966) believed that a person experiences events in which they have relatively no control over the outcome (external control) and other events in which their beliefs, actions, and behaviors influence the outcome (internal control). During continued research on the topic of self-efficacy, Bandura (1997) defined outcome expectancy as how a person feels his or her behavior will produce a particular outcome. The major difference in the theories of Rotter (1966) and Bandura (1997) is that Rotter's locus of control makes references to the person's belief that ability will produce desired effects, while self-efficacy, as described by Bandura, refers to an individual's sense of his or her ability in a situation. Thus, teacher self-efficacy (TSE) describes the confidence teachers have in their capacity to promote student achievement (Zee & Koomen, 2016). Throughout the review of the literature, there was an apparent gap in relevant information

regarding teacher self-efficacy and the use of classroom technology (Heath, 2017; Lemon & Garvis, 2016; Leu et al., 2015; Miles, 2013; Zhang & Zeller, 2016).

Conceptual Framework

Technology is more than a support device in today's classroom; it is a tool used to optimize and enhance learning (Zhang & Zeller, 2016). To meet the increasing demands of globalization and meet the academic needs of students in America, a technology-integrated curriculum must be used (Aydin, Ozfidan, & Carothers, 2017). Educators have the responsibility to prepare students for a future that will be driven by technology and their ability to appropriately interact with digital devices (National Education Association, 2012). Bandura's (1997) theory of self-efficacy provides a foundation to better understand why some teachers actively engage in technology-supported instruction and others reject the use of computers and other devices. The theoretical framework of this study is grounded in Bandura's (1994) social cognitive theory and the theoretical framework of technological pedagogical content knowledge (TPACK).

Bandura's social cognitive theory. The social cognitive theory built upon traditional constructivist thinking and beliefs that students use prior knowledge and active engagement to formulate meaning about a particular topic (Bandura, 1994). The general idea is that learners can construct their knowledge. Teachers introduce and facilitate learning with technology, but students develop their ideas and representations by interacting with technology as a part of the investigation (Jonassen, Peck, & Wilson, 1999). Working with others or collaboration is another element of constructivism that influences the use of technology. When students develop relationships and work together towards a common goal, high-order thinking skills, and creativity improve (Hwang et al., 2015). Moreover, Andreasson (2015) explained that students living in poverty have a greater need for effective technology instruction due to digital gaps and

the influence of computer-assisted learning. As this study focuses on teacher technology self-efficacy in an urban school division, it is important to remember the digital divide and how a teacher's beliefs, feelings, and confidence guides them towards adopting CAI or avoiding it all costs.

Bandura (1977) believed that individuals learn and grow through relationships and different levels of experience. Likewise, behavior patterns are learned through observational experiences in the environment (Bandura, 1997). This learning occurs when people observe models, encode the behavior they witnessed, and decide to identify or adopt the behaviors of the model (McLeod, 2016). While people may copy what they see in efforts to recreate similar positive outcomes, they also tend to make mental notes of practices that were unsuccessful or produced negative outcomes. Bandura's (1977) social learning theory agreed with the behaviorist learning theories that learning develops from observable external behavior through association, rewards, and consequences. Although, Bandura's (1994) theory recognized the cognitive, internal factors that act as mediators when determining if a behavior is worth modeling.

Self-efficacy. This framework was used to organize and guide exploration into teacher self-efficacy and computer-assisted instruction as factors that influence student learning and achievement. In a review of the literature related to the functions of teacher knowledge, research supports the notion that student achievement is a determining factor in the teachers' ability to use technology as an instructional tool (Bandura, 1997; Matthew, Koehler, & Mishra, 2015; Tonduer et al., 2017). Bandura (1997) discussed self-efficacy as a strong indicator of how well an individual will perform based on their confidence, motivation, and desire to complete a task. With respect to technology education, self-efficacy plays a major role in how a teacher views technology as a tool for their students based on their personal thoughts and experiences (Lemon

& Garvis, 2016). For instance, a teacher with low technology self-efficacy may rely heavily on print-based materials and manipulatives for instruction rather than attempting to utilize computers or digital resources they are uncomfortable with.

According to Schwarzer (2014), "self-efficacy beliefs regulate human functioning through cognitive, motivational, affective, and selective processes" (p. 10). Bandura (1977) believed that thought initiates patterns of behaviors that influence performance. For example, as people reflect on their capabilities, goals are set and the limitations of their abilities become more evident. Research has shown that individuals with stronger perceived self-efficacy set much higher goals for themselves and are more likely to stick to them than those with a low sense of efficacy (Bandura & Wood, 1989; Pfitzner-Eden, 2016). Bandura (1995) explained that in regard to the self-efficacy theory, performance and motivation are a product of a person's belief in their own perceived effectiveness. In fact, several studies have shown that individuals who visualized themselves completing tasks at a high level went on to perform much better during follow-up activities (Chesnut & Burley, 2015; Kissau & Algozzine, 2015; Minshew & Anderson, 2015). As the demand for teacher effectiveness increases, understanding how self-efficacy affects technology integration could be an instrumental tool to support academic achievement.

The theoretical framework of TPACK. TPACK brings together three critical components of knowledge content, pedagogy, and technology to examine the connections, benefits, and difficulties they share (Matthew et al., 2015). As a theoretical framework, TPACK focuses on instruction and learning that is based on integrating technology into effective teaching to meet the academic needs of students. The knowledge produced through TPACK is the product of teachers developing skills and understanding of general content, pedagogy, and technology as they relate to learning (Hofer & Harris, 2017). Today, expert teachers are recognized as those

who can blend content knowledge, best practices, and technology (Ansari & Malik, 2013). The foundations of TPACK are the interactions between the three knowledge components: content, pedagogy, and technology (Matthew et al., 2015).

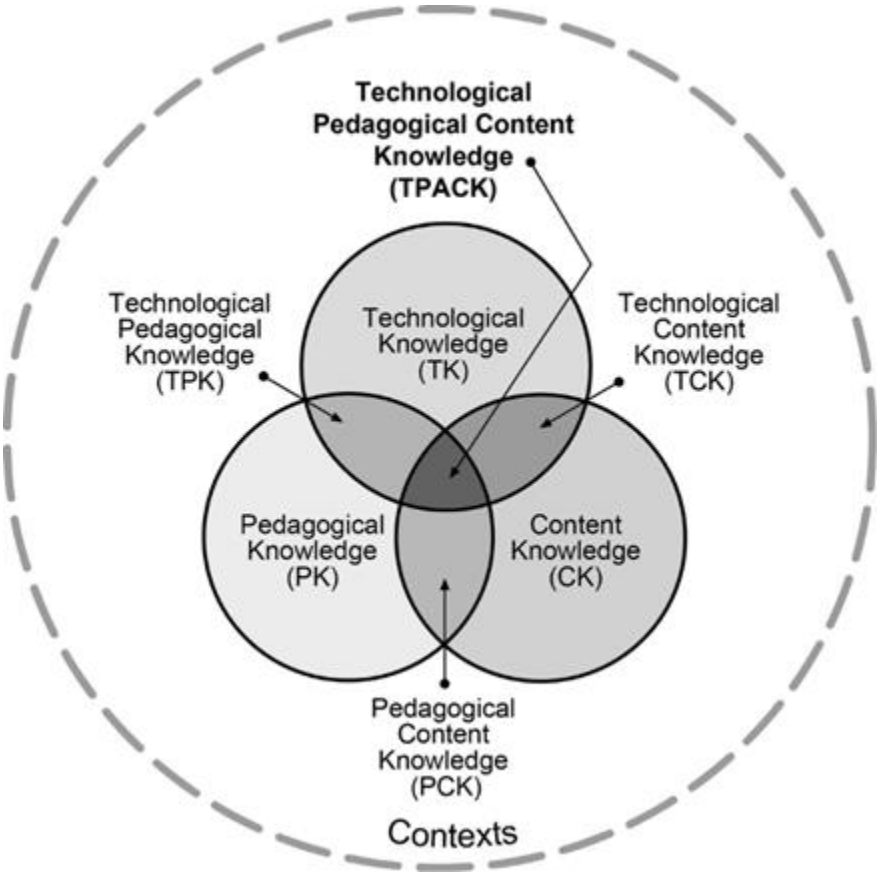

Figure 1. Technological pedagogical content knowledge (TPACK) Model. Adapted from Koehler and. Mishra (2014).

Many teachers are not prepared to meet the demands of TPACK. This leads to gaps in learning and diminished confidence in using technology as a part of instruction. In previous studies, researchers identified the need to investigate how teacher knowledge influenced learning. According to Matthew et al. (2015), knowing and understanding content area material is extremely important to teachers. Shulman (1986) reinforced the need for teachers not only to understand the truth in the subject matter but also understand why it is true or relevant. Over the

past 10 years, there has been a significant change in the amount and quality of teacher knowledge considered important for delivering standards-based instruction (Kim et al., 2015; Luft & Hewson, 2014). As a part of student growth and preparation, Schwab (1964) believed that subject matter knowledge included multiple methods of understanding content, as well as various ways of evaluating and validating new knowledge. In contrast, Shulman (1986) suggested that teachers with greater pedagogical content knowledge provided more opportunities and a wider range of perspectives for student learning.

The use of CAI offers teachers a practical method of presenting core concepts in a way that effectively addresses student needs on an individual basis. Clearly, there is a need for teachers with extensive training and experience using technology-based instruction to address the expanding gap in digital skills. Papanikolaou et al. (2017) did not expect TPACK to address what content teachers should teach, but rather work as a model for creating links between content, pedagogy, and the use of technology. TPACK training helps build capacity for creative uses of technology that connects to pedagogy and the teacher's content knowledge (Millen & Gable, 2016). Teachers who possess extensive pedagogical knowledge understand and relate to how students acquire knowledge, increase skills, and adopt effective habits that promote a greater understanding of the content (Matthew et al., 2015). Through TPACK focused professional development and classroom participation, teachers experience growth in maximizing the ability technology has to support content mastery (Hofer & Harris, 2017). Koehler and Mishra (2014) suggested integrating types of knowledge as a method of building a complex knowledge that teachers require to promote mastery in their instruction. Student success relies on what teachers know and how confident they are in their ability to translate what they

know into learning opportunities. Thus, teachers with high technology self-efficacy have little difficulty using technology to support knowledge transfer in a variety of ways.

While technology is constantly changing and evolving, defining technology knowledge requires an active approach to understanding what students need and how new technology applies to the process of teaching and learning. Implementing technology helps teachers gain the ability to reform the structure of teaching and learning to produce 24–7 access to content and 21st-century skills (U.S. Department of Education, 2017). Low socioeconomic status (SES) and "at-risk" students possess a greater need for teacher assistance and guidance with technology (Darling-Hammond et al., 2014). Teacher interaction and usage of technology for planning, instruction, and assessment have increased in recent years, yet Ertmer and Ottenbreit-Leftwich (2013) found outdated resources still being used in the classroom.

In examining teacher technology self-efficacy as it relates to student achievement using technology, it is important to note motivation, confidence in ability, and understanding of the technology are key factors (Kim et al., 2013). In the classroom of a teacher with high technology self-efficacy, technological knowledge is also high. Current research does not provide efficient evidence to support teacher technology self-efficacy as a factor in addressing disparities in academic support with computer-assisted instruction and learning. In this study, self-efficacy is instrumental in helping understand the psychological perspective of teachers and their decisions to use technology as a tool. In fact, Bandura (2008) explained the importance of a greater sense of self-efficacy by describing how growth influences life experiences. Bandura (2008) argued that self-efficacy is not an inherited trait, but something that can be influenced, developed and strengthened. Bandura's theory of development supports the research in this study indicating that

teacher technology self-efficacy improves over time through meaningful experiences, training, and a curriculum conducive to computer-assisted instruction.

Review of Research Literature and Methodological Literature

Challenges in urban elementary education. Elementary schools located in urban communities represent a variety of cultures, conditions, languages, and values (Murrell, 2017). While these schools have cultural and educational assets, negative perceptions of dilapidated buildings, crowded classrooms, unruly behavior, poor parental involvement, low test scores, and poverty influence the view of urban education (Posey-Maddox, 2014). According to the Joint Legislative Audit and Review Commission (JLARC; 2014) report to the governor and general assembly of Virginia, sustained improvements in student academic achievement is challenging due to the negative influence of uncontrollable factors within communities. In Virginia, as in many other states, additional state and federal funds are set aside for low performing urban schools based on poverty, minority, and limited English proficiency percentages (Virginia Department of Education, 2018b). Nevertheless, students attending the high poverty urban schools are more likely to score lower on Standards of Learning (SOL) tests, miss more days of school, have reported behavior incidents, and change schools during the year (JLARC, 2014).

The reauthorization of the Elementary and Secondary Education Act (ESEA) expanded the funds, programs, and initiatives available for schools servicing high numbers of disadvantaged students. Increases in Title I, the largest program under ESEA, sparked a national debate over whether there have been verifiable increases in academic progress and test scores to warrant the changes (Welner & Mathis, 2015). While past research on urban education has shown positive improvements in test scores and attendance in high poverty schools receiving federal aid, several studies argue that urban schools have not shown levels of growth to justify

increased spending (Hodge, Taylor, & Frankenberg, 2016; Posey-Maddox, 2014). Several factors contribute to disadvantaged students not performing at the same academic levels as their peers (Banerjee, 2016). Minorities, immigrants, and children from low socio-economic backgrounds face negative perceptions and low expectations in the classroom due to implicit biases and institutional discrimination (Ayón, 2016; Banerjee, 2016; Brown, 2015).

A recurring theme throughout the review of the literature was the need for teacher training and professional development in urban school divisions to address educational disparities and gaps in the use of technology (Blackwell et al., 2013; Ertmer & Ottenbreit-Leftwich, 2013; Hofer & Harris, 2017). Herold (2016) argued that despite significant funding and resources intended to improve academic achievement, teachers are hesitant to change their teaching methods. In fact, researchers identified numerous reasons teachers choose to avoid teaching with technology, including teacher self-efficacy, inadequate training, restrictive policies, and the lack of time for implementation (Herold, 2016; Lee & Lee, 2014; Zipke, 2017).

Technology-based instruction. Technology has been a part of teaching and learning for hundreds of years. Dating back to the early New England private grammar schools and Colonial public schoolhouses, simple forms of technology paved the way for what we recognize as key factors of daily instruction today. Although, computers have only been a part of classroom instruction and learning for close to four decades (Horn & Staker, 2014). In efforts to better understand how technology has influenced education in and out of the classroom, Deloitte (2016) found that over 98% of teachers have at least one computer, and 93% of classroom computers have internet access. Moreover, the same study revealed 72% of pre-K through 12th-grade teachers reported that technology benefits student motivation and allows them to reteach and develop new content inquiries (Deloitte, 2016).

The U.S. Department of Education released the National Education Technology Plan in an effort to "develop a vision and plan for learning enabled by technology through building on the work of leading education researchers; district, school, and higher education leaders; classroom teachers; developers; entrepreneurs; and nonprofit organizations" (U.S. Department of Education, 2017, p. 3). While school divisions all across the country understood the call for increased utilization of technology-based instruction, many teachers lacked training and faced difficulties integrating technology into their instructional practices. State, division, and school-based professional development have focused on technology and preparing teachers for effective delivery of what Ertmer and Ottenbreit-Leftwich (2013) referred to as meaningful classroom experiences. The increase in the availability of technology resources and targeted development has not changed personal barriers that cause some teachers to fear technology-integrated instruction in their classrooms (Blackwell et al., 2013).

Traditionally, teachers have been one of the most conservative groups when it comes to using technology as a means of improving the work environment. Teachers tend to find comfort in traditional practices and rely on methods that have been effective for them or others in the past (Ertmer & Ottenbreit-Leftwich, 2013). Since the early 1980s, when computers and digital media were introduced to the classroom, teachers have been looking for ways to improve instruction while managing the disadvantages and roadblocks that come along with integrating technology (Bakir, 2016; Davies & West, 2014; Hammonds, Matherson, Wilson, & Wright, 2013). In the beginning, computers were simply used as a method of improving productivity for administrators and teachers. Teachers used computers for the daily routine of taking attendance, creating lesson plans, communicating with parents, and maintaining student grades (Bhalla, 2013). Although many teachers had computers in their classrooms, they were only being used for noninstructional

duties. As the effectiveness and accessibility of technology improved, schools began creating computer labs or technology centers for students to use from time to time. In some cases, these labs were reserved for group instruction of basic computer skills and simple programming (Molnar, 1997). Computers were not being used as an instructional tool until the introduction of CAI in the late 1960s at Stanford University (Suppes & Morningstar, 2014).

In 1959, researchers at the University of Illinois designed PLATO, a large central computer connected to terminals that could interact with the computer through the use of educational media and learning aids (Molnar, 1997). The PLATO system was programmed according to the content or material to be learned by students. Students had the ability to work independently, receiving immediate feedback from the terminal without interruptions. The system would record the students' responses and track progress towards the overall learning objective. PLATO systems gave teachers the ability to tailor lessons to the need of the student, something the earlier versions of CAI could not accomplish (Alderman, Appel, & Murphy, 1978). Ironically, the PLATO systems and many of the other computer-assisted learning devices at this time were intended for research purposes and not focused on directly supporting student academic progress (Molnar, 1997; Peterson, 2016; Pirolli, 2014).

The breakthrough in technology-based instruction came in 1963 when researchers at Dartmouth College developed a "time sharing" system based on early concepts of small digital computers (Trustees of Dartmouth College, 2010). Dartmouth mathematicians John Kemeny and Thomas Kurtz created BASIC, a simplified, user-friendly computer language that allowed students to interact with computers in a more efficient manner (Lorenzo, 2017; Molnar, 1997; Trustees of Dartmouth College, 2010). Meanwhile, researchers at Stanford, not to be outdone by their Dartmouth counterparts, developed a computer-assisted instructional program for math and

reading (Suppes, 1972). The advancements in CAI allowed students to work at their own pace, correct their answers, and receive ongoing feedback on the content they studied (Goldberg & Suppes, 1976). BASIC led to the more advanced computer language LOGO, developed in the early 1970s by the Massachusetts Institute of Technology professor Seymour Papert. Often criticized for his beliefs in technology as an instructional tool, Papert (1993) insisted, "The role of the teacher is to create the conditions for invention rather than provide ready-made knowledge" (p. 132). Papert's theory of constructionism and connection with LEGO led to the beginnings of project-based learning through the use of computer-supported hands-on project kits that helped students solve real-world problems (Resnick & Ocko, 1990).

As the availability of the internet and online resources increased, the true power of technology-based instruction and CAI emerged. In 2017, close to 95% of public school districts in the United States had high-speed internet access, compared to 30% in 2013 (Marwell, 2017). The internet was mostly used for front office communication between schools and families, but the trend of educational websites, streaming videos, and social media changed that dynamic in rural and urban districts (Bulman & Fairlie, 2016; Pugh et al., 2018). The use of the internet in the classroom for communication and instructional purposes has greatly increased for the most part due to the influence it has on our daily lives (Greenhow & Askari, 2017; Sánchez, Cortijo, & Javed, 2014).

Current issues with instruction. The National Science Foundation founded the science, technology, engineering, and math (STEM) initiative along with the U.S. Department of education in efforts to help prepare students to become global innovators, leaders, and developers (U.S. Department of Education, 2017). With the initiation of the Every Student Succeeds Act (ESSA), lawmakers saw the need to place a direct focus on the achievement gaps

that were created by the previous versions of the law. Of the many changes brought forth by ESSA, an increased effort to promote math and science education stands out as a key factor in preparing students for their technological future (Hayes, 2017). State and local divisions are key contributors to meeting the needs of elementary science education initiatives. Levy et al. (2016) suggested that recruiting and hiring high-quality science specialists and STEM-trained instructors directly support elementary science education. Likewise, school-based professional development focused on current research, best practices, and technology integration advances science and math education initiatives.

Some argue that problems exist in early childhood education and the use of technology due to the foundations of education that teachers are being taught. Guerriero (2017) pointed out the relationship between developing teachers through the theories of Piaget, Vygotsky, and others rather than a holistic approach that acknowledges new technology and research related to the way students learn. Sousa (2016) studied how the brain learns and found that new technological innovations grant the ability to look inside the "living brain" for research (p. 1). The STEM initiative suggests that understanding the way the brain works and how each individual involved in the learning process formulates knowledge in their unique way is vital to improving education. Constructivist pedagogical practices, project-based learning, and technology-assisted instruction should dictate the 21st-century math and science curriculum (Capraro & Slough, 2013).

Motivating teachers and students to use technology. Today, students as young as six years old arrive to class with smartphones and iPads. For teachers, technology has changed the way information is presented, received, and used at school and in homes (Gronn, Scott, Edwards, & Henderson, 2014). STEM education and research have expanded the capacity for learning,

creativity, and exploration in the 21st Century elementary science classroom (Carey, 2013). While serving as U.S. Secretary of Education, Anne Duncan believed that schools in the United States were only in the initial stages of harnessing the power of technology for learning purposes (U.S. Department of Education, 2017). All communities must have access to technology and make it a necessary component in every school. Moreover, state and local division officials must view technology as a critical area of educational support and continue to invest in new resources that provide students and teachers with the best opportunities to grow professionally and academically. As exposure to technology increases, students and teachers are motivated to explore alternative methods of instruction and learning. This study looks to analyze the connection between various levels of teacher technology self-efficacy and motivation towards adopting technology-based instructional strategies.

Self-efficacy, as it relates to motivating both teachers and students is driven by the individuals' perception or beliefs regarding his or her ability to succeed (Doménech-Betoret, Abellán-Roselló, & Gómez-Artiga, 2017). According to Gilakjani et al. (2013),

> many factors appeal to teachers to use computer technology in their classrooms. These factors include computer self-efficacy, personal technology use, positive teacher attitudes and beliefs towards technology and access to professional development in the computer technology area. All of these are significant in motivating teachers to use technology. (p. 49)

Teachers with low self-efficacy and confidence using technology in the classroom typically lack training and positive experiences with technology integration (Pugh et al., 2018). Self-efficacy is a significant indicator to predict effective technology integration into teaching and learning (Lee & Lee, 2014). Understanding the position of teachers who are having difficulties with

technology integration is needed to provide proper resources and training focused on improving technology self-efficacy.

Benefits and barriers to computer-assisted learning. The goal of technology-based education is to integrate core academic subjects such as reading, science, history, and math with innovation, creativity, and problem-based learning experiences (Koehler & Mishra, 2014). As a part of globalization and the growth of digital information, technology has quickly changed the way students approach knowledge acquisition. A major benefit of computer-assisted learning is the flexibility students have to explore and experience content from different perspectives (Darling-Hammond et al., 2014; Daugherty et al., 2014). Also, teachers have the freedom to observe, facilitate, and informally assess students as they engage in technology-driven coursework.

Ertmer and Ottenbreit-Leftwich (2013) identified internal and external technology barriers that influence the use of technology in classrooms. Internal barriers are those issues that relate to how comfortable teachers are using technology, which includes their attitudes and personal beliefs about using technology as a tool (Kim et al., 2013). For example, a common internal barrier is presented when teachers avoid using technology or opt to use print materials due to the lack of confidence or an inability to use digital resources. Shifflet and Weilbacher (2015) explained that limited funding, state performance standards, and insufficient time for implementation as external barriers to teachers using technology. Moreover, Hammonds et al. (2013) argued that personal experience also plays a significant role in whether or not technology integration becomes a consistent practice in the classroom. Researchers found that individuals who had limited or no experience in learning with technology were less likely to depend on technology for classroom instruction. In contrast, teachers who display high technology self-

efficacy will more than likely recognize the value in CAI and choose to integrate technology throughout the taught curriculum.

Review of Methodological Issues

In prior studies, researchers used qualitative, quantitative, and mixed methodologies to research teacher self-efficacy. Qualitative research is primarily exploratory and is used to gain an understanding of personal experiences and beliefs. Qualitative research methods allow researchers to study selected issues in depth within a chosen situation or context. The quantitative research method was also reviewed in the literature. The quantitative method uses numerical data to quantify a problem. In a quantitative research method, measurable data is used to formulate facts and generate knowledge for understanding in research. Lastly, the mixed method approach was reviewed in the literature. This method is a combination of quantitative and qualitative research methods. The mixed methods research approach was used in most studies focused on teacher self-efficacy and its influence on classroom management, retention rates, student motivation, and technology integration. The research methods in the research literature were reviewed and carefully evaluated to ensure that the research method most suitable for this particular study of self-efficacy was chosen.

Mixed methods. The review of the literature regarding self-efficacy as it relates to classroom teachers and the use of technology revealed an extensive amount of research pertaining to factors influencing beliefs, feelings, attitudes, and perceptions of teachers. Several studies connected these factors to the decline in teacher quality and retention rates of qualified elementary school instructors (Elliott, Isaacs, & Chugani, 2010; Kim et al., 2013). These studies used a combination of qualitative research analysis and information obtained from surveys, interviews, and observations. Elliott et al. (2010) used a survey based on the Florida Educator

Accomplishment Practices (FEAP) to collect data for their qualitative/quantitative study. Researchers believed that focusing on how self-efficacy influences teacher retention could be useful in designing programs that enhance or support schools in need. The survey used open-ended questions to perceptions, attitudes, skills, and career plans of teachers in three separate school divisions. The results were coded, separated, and categorized based on the qualitative responses of teachers who submitted the self-report on their type of certification, area of concentration, and instructional grade level. Elliott et al. (2010) used Levene's *F* test and two-tailed *t* tests in a prior study to determine if there was any difference in attending a traditional university and obtaining certification compared to alternative teacher certifications.

A limitation of the Elliott et al.'s (2010) research was that it included 194 teachers out of a possible 1,800 in the three school divisions used for the study. With a limited number of participants, the results may not fully represent the general teacher population and could simply be specific to the area or locations largely represented. Furthermore, the qualitative research included in the study was based on open-ended questions, which are representations of the individuals and are not easily verifiable as years of experience, age, or certifications.

Kim et al. (2013) also used a mixed-method approach to study how teacher beliefs and attitudes contribute to technology integration. The four-year study included 22 teachers who taught in classrooms for at least two years as participants in a project funded by the U.S. Department of Education funded. Of the participants, 15 were elementary teachers and the remaining seven taught middle school students. The Comprehensive School Reform program was initiated to provide additional resources, professional development, and technical support to struggling K–8 schools in the Southeastern United States (Kim et al., 2013). Computers, laptops, smartboards, digital cameras, and other resources were delivered to participating schools for

teachers to utilize. Also, workshops, training, and extensive professional development sessions were offered over the summer and throughout the year. Finally, teachers received phone calls and video consultations to address technical issues and pedagogical strategies.

Each participant in the study was given a questionnaire based on the Epistemological Belief Questionnaire (EBQ) developed by Schommer (1990). The questionnaire contained 63 response items that examined five elements of teacher beliefs about knowledge and learning. A second survey was used to measure teacher beliefs about effective teaching methods and strategies. Kim et al. (2013) used portions of the Teaching, Learning, and Computing (TLC) survey, U.S. Department of Education and National Science Foundation, to focus on teaching practices exclusive of technology. Finally, classroom observations, interviews, and surveys were used to measure technology usage and integration in classrooms. The Concern-Based Adoption Model (CBAM) survey, developed by Hall and Hord (1987), was used to measure concerns teachers expressed towards new practices and how those concerns influence teaching.

Possible limitations presented by Kim et al. (2013) were due to the small number of participants, differences in methods of integrating technology, and the inconsistency of teacher beliefs. The study only examined 22 teachers from eight schools. This small sample does not accurately represent teachers and technology integration of all schools in the United States. Also, throughout the study schools utilized different methods of integrating technology into classrooms. Without a standard method of integration and limited participants, researchers were limited and could have taken a more in-depth look at procedural differences. Lastly, teacher beliefs and actual classroom practices differ. While some teachers believed that technology was essential for growth and achievement, they did not actively engage in effective integration practices (Kim et al., 2013).

Self-efficacy scale. Several researchers used self-efficacy scales as a method of gaining a sense of perceived self-efficacy teachers have regarding instruction, the use of technology, and integration (Gronn et al., 2014; Kent & Giles, 2017; Lemon & Garvis, 2016). Bandura (2006) constructed the Self-Efficacy Scale (SES) based on the foundations of the social cognitive theory and "can do" phrases as it pertains to tasks. The Teacher Self-Efficacy Scale (TSES), created by Tschannen-Moran and Woolfolk Hoy (2001), has served as the primary research instrument for many researchers looking to learn more about perceived self-efficacy. McGee and Wang (2014) believed that the availability in long form and short form, established validity, and proven reliability were advantages of the widely used TSES. Kent and Giles (2017) utilized the TSES scale to develop an instrument for measuring teacher technology self-efficacy. The Likert-type, 5-item survey was constructed to measure self-efficacy towards technology-based instruction and learning.

Limitations presented in the studies utilizing teacher self-efficacy scales were small groups of surveyed teachers, poor representations of evolving practices and changes in beliefs, and the use of self-reporting (Kent & Giles, 2017; Lemon & Garvis, 2016). In some instances, the sample size of teachers may have been too small to fully represent the population of teachers utilizing technology in the classroom; therefore, larger studies may be required to gather a better understanding. Taking advantage of new technology enables teachers to empower students with information (Andreasson, 2015). Studies that focused on one device or limited interactions to specific technology may have missed opportunities to learn more about integration practices through alternative sources. Finally, the Likert-type survey as a data collection instrument presents limitations through the nature of questioning (Kent & Giles, 2017). Due to the survey being a self-reporting research, room for bias may be present depending on how questions are

presented. Likewise, determining if participants are truthfully representing their beliefs has to be considered when using self-reporting.

Synthesis of Research Findings

The growing need for technology-infused classrooms has created a need for more information pertaining to teacher-self efficacy and perceived confidence in methods of integrated instruction (Kazan & EL-Daou, 2016; Kim et al., 2013; Lemon & Garvis, 2016). In previous studies, confidence or the belief in one's ability to complete particular tasks using technology was identified as a key factor in the degree in which teachers engaged students in digital learning (Li et al., 2015; Yerdelen-Damar et al., 2017). Teachers who enter the classroom confident in their ability to use technology and use the internet as a tool have been found to be more accepting of new methods of learning and instruction (Kao et al., 2014; Wang et al., 2014). Researchers looking for a greater understanding of why technology is not consistently used in classrooms looked to three main factors: (a) insufficient experience and knowledge of technology, (b) personal beliefs and assumptions, and (c) lack of time and resources (Heath, 2017; Kim et al., 2013; Matthew et al., 2015).

Howard and Thompson (2016) argued that technology integration presents difficulties for individuals in many different fields due to the complexity of combining various teaching and learning practices into an effective model. Technology integration is not a one-size-fits-all topic; what works for some will cause catastrophic problems for others (Alaniz & Wilson, 2015). Matthew et al. (2015) found that technology ranged from simple analog devices to extremely complicated digital programs. Some research studies found that teacher beliefs and attitudes significantly influence actions and behaviors, even when the most effective strategies and cutting-edge technology are a part of classroom instruction (Heath, 2017; Li et al., 2015; Shifflet

& Weilbacher, 2015). When teachers have prior experiences, concerns, and preconceived ideas about technology, they tend to develop norms based on personal beliefs rather than evidence-based practices (Colucci-Gray et al., 2013; Eady & Lockyer, 2013; Ertmer & Ottenbreit-Leftwich, 2013).

Several researchers explained that the lack of funding (Plumb & Kautz, 2016), intrusive training (Hofer & Harris, 2017; Miles, 2013) and poor planning practices (Daugherty et al., 2014) are major barriers to teaching with technology. The price of computers, handheld devices, and smartphones has fallen significantly over the past decade, but the cost of educational technologies often still requires extensive funding for initial purchases, service contracts, and warranties (Andreasson, 2015; Davies & West, 2014). Overall, researchers acknowledged technology usage and classroom integration as a continued effort for all involved; yet, funding, professional development, and sufficient planning and implementation time are essential to change (Guerriero, 2017; Matthew et al., 2015; NEA, 2012).

Critique of Previous Research

Currently, in the area of teacher technology self-efficacy, as it applies to computer-assisted instruction and learning, there are a limited number of research studies available. In studies conducted on general teacher self-efficacy, evidence suggests that teachers with greater instructional self-efficacy will engage in new teaching methods and accept changes in traditional practices at a much higher rate than teachers with concerns about their ability (Hoy & Spero, 2005; Yerdelen-Damar et al., 2017). Bandura (1997, 2006) noted that self-efficacy is best described as an individual's ability to predict how he or she will perform on specific tasks. Many researchers conducted studies that involved small sample sizes or focused on teachers rather than

the influence low self-efficacy has on students (Kao et al., 2014; Lemon & Garvis, 2016; Li et al., 2015; Yerdelen-Damar et al., 2017).

Much of the research present in the literature is based on qualitative studies or meta-analyses that compile data from a variety of studies. In the qualitative studies, sample sizes were relatively small and consisted of participants that did not necessarily represent the target population. Moreover, qualitative research studies with limited participants tend to provide results that are specific to a particular area or location and are not generalizable (Hofer & Harris, 2017; Keengwe, Schnellert, & Jonas, 2014; Wu, Chen, Yeh, Wang, & Chang, 2014). Hofer and Harris (2017) conducted a study in six states that were participating in a web-based initiative focusing on resource and curriculum development. The study evaluated seven experienced social studies teachers who were trained in TPACK and asked to follow the strategies during instruction. The small sample size raised some concerns. Achieving goals of diverse groups and building an understanding of how those individuals respond to efforts to increase technology-based instruction requires diversity among research participants representing the targeted groups (Han, Capraro, & Capraro, 2015; Renzulli & Reis, 2015). While examining teacher technology self-efficacy, this study focused on diversity and a sample size that properly represents the targeted population.

Kao et al. (2014) developed a method of measuring self-efficacy and teacher attitudes regarding professional development and training focused mainly on perceptions and not actual classroom situations. Teacher self-efficacy as it relates to instructional practices, student interaction, and computer-based learning opportunities is needed to further examine the disparities in the use of classroom technology. Additionally, early research by Kao et al. only surveyed eight elementary teachers to gather information on teacher efficacy relating to web-

based training. The research led to the development of the much larger survey, but the validity of the initial research is to be questioned based on the limited sample size and the intended purpose of the survey. The interviews conducted with a small group of participants and their perceptions had a high possibility of validity issues (Kao et al., 2014). Likewise, Li et al. (2015) noted that larger sample sizes were needed for generalization among different populations. Researchers also found that more focus needed to be on the connection between teacher technology usage and student perceptions of CAL and taking risks utilizing digital resources (Gardenhire et al., 2016; Li et al., 2015). The limitations found in these research studies contributed to conducting the current study with the understanding that further research is needed in the area of teacher technology self-efficacy and student achievement, particularly in diverse settings.

Chapter 2 Summary

The review of the literature has provided evidence supporting the importance of teacher technology self-efficacy and utilizing computer-assisted instruction to improve academic achievement. Research has shown that there are several factors related to increasing student achievement using technology. Among these factors, perceived self-efficacy was a key element in teacher training, development, and retention research. The conceptual framework of this study is based on Bandura's (1994) belief in self-efficacy as a determining factor in how technology is used in a teacher's classroom. Likewise, TPACK provides the theoretical knowledge base of technology instruction and learning. Researchers found that the connection between teacher technology self-efficacy and TPACK is important because active engagement and motivation increases when teachers and students understand how things work (Ansari & Malik, 2013; Matthew et al., 2015). To date, researchers have not provided a clear representation of how teacher self-efficacy and technology-based instruction influences students.

Discovering the influence teacher technology self-efficacy has on student achievement also required researchers to examine professional development practices, advances in technology, and existing benefits and barriers. Changes in Virginia State Curriculum and the National Education Technology Plan have led to professional development requirements that focus on teacher quality and retention; this is important because valuable in-service training and technical resource support are easily lost when teacher turnover is high (Redman, 2015). Preparing teachers for CAI requires effective planning that addresses funding, administrative support, and consistent feedback throughout the process (Kopcha, Ottenbreit-Leftwich, Jung, & Baser, 2014; Murray & Rabiner, 2014; Voogt & McKenney, 2017). By helping teachers build technology self-efficacy, administrators and school leaders emphasize the need for effective classroom practices and 21st-century skills for all students. There are endless benefits to technology in education, but there are also disadvantages that can cause serious programmatic and academic issues in the classroom (Churcher, 2014). This study looks to identify the relationship between teacher technology self-efficacy and the factors that lead to positive results or problems in the classroom. The information provided in this study can help educators make a connection between high teacher technology self-efficacy and improved classroom practices that narrow the digital divide and improve academic achievement.

Chapter 3: Methodology

Introduction

The intent of this study was to explore influences on teacher self-efficacy on the use of computer-assisted instruction in urban elementary schools in Virginia. The research design was qualitative, in the form of an exploratory case study. The literature review was used to assist the researcher in selecting a research method that was most suitable for this particular study of self-efficacy. Bandura's (1994) social cognitive theory and TPACK (Mishra & Koehler, 2006) provided the theoretical framework for this study. Through exploring teacher self-efficacy and knowledge as they apply to the use of technology in the classroom, this research showed areas of need in urban elementary classrooms in Virginia. This information will be beneficial for individuals looking to improve training, technology integration, and digital confidence in urban elementary educators. The goal of this chapter is to provide details of the research design, research questions, methodology, population, sampling, data sources and collection processes, evaluation methods, limitations, and ethical issues in the study.

Research Question

The following research question guided this study in order to explore teacher technology self-efficacy in urban elementary schools:

RQ: How does teacher technology self-efficacy influence computer-assisted instruction in urban elementary schools in Virginia?

Purpose and Design of the Study

Purpose of the study. The qualitative research method was used in this study to gain a better understanding of how teachers perceive their ability to use technology for instructional purposes (Creswell, 2013). Self-efficacy was the central phenomenon that the researcher

explored for deeper understanding. The role of the researcher in this study was to attempt to access the thoughts, feelings, and beliefs of participating teachers, about CAI (Sutton & Austin, 2015). The researcher focused on the experiences from the participants' perspective (Kim et al., 2013; Taylor, Bogdan, & DeVault, 2015; Yin, 2017). According to Creswell (2013), qualitative research allowed participants to recall real experiences from a natural setting to form a holistic view of world problems. In the review of the relative literature, qualitative, quantitative, and mixed-methods approaches were used in previous studies involving teacher self-efficacy. For the research question this study sought to answer, it was determined that the qualitative approach which incorporates a questionnaire, focus groups, and personal interviews would be the most effective design.

Research design. The exploratory case study design was employed in this study. Case study research allowed the researcher to narrow down broad fields of research in order to conduct an in-depth study of a specific problem (Creswell, 2013). According to Yin (2017), the advantage of case study research is the ability to focus on the specifics of a problem that other methods fail to cover. A case study works well when there is not much information available on a topic or issue. Three types of case studies are exploratory, descriptive, and explanatory (Yin, 2017). For this study, a single exploratory case study was appropriate because the researcher sought to understand how teachers perceive their ability to teach with technology in a division that has placed an emphasis on computer-assisted learning. The exploratory case study explores distinct phenomena characterized and by a specific research environment that limits the choice of methodology (Mills, Durepos, & Wiebe).

This study focused on teachers in grades first through fifth, to explore how teachers perceive their ability to use technology as an effective instructional tool in the classroom. With

permission, the researcher used the Technology Proficiency Self-Assessment (TPSA v1.0; Ropp, 1999). While this particular instrument is designed for teaching and learning with computers, the TPSA (see Appendix A) fundamentally measures teacher self-efficacy (Christensen & Knezek, 2017). The questions were converted into an online Qualtrics version of the TPSA the results of which teachers completed and submitted electronically. According to Bandura (2006), perceived self-efficacy is not something we can simply measure with a universal approach. In order to address the problem or issue in a particular study, scales for measuring perceived self-efficacy should be customized and free of generic questioning.

Research Population and Sampling Method

The target population for this study was 200 teachers in grades first through fifth, from multiple elementary school campuses in Virginia. Each participant had classroom computers, assistive technology, or access to a school-based computer lab. For the purpose of this study, teachers without reliable technology or access to computers for instructional purposes were not be considered. Statistic Brain (2017) found that 98% of schools in the United States have one or more computers in classrooms. More specifically, in Virginia, students are required to use a computer to take SOL assessments (Virginia Department of Education, 2018b). Therefore, only a few, rare circumstances will result in teachers being without access to technology on a daily basis.

The participants from each school were selected from a pool of teachers who voluntarily complete the online questionnaire. These teachers had the freedom to request that their information not is used and leave the study at any time. After approval from division administrators and principals, each participant received information about the study. An email with a link to the online questionnaire was sent out to first-grade through fifth-grade teachers in

the target schools. From the target population, 20 teachers were selected as the sample for this case study. Yin (2017) suggested that case study research should undergo a formal case study screening when there is an abundance of qualified participants. The screening process involved reviewing the quantified data from the online questionnaire, grouping individuals according to their perceived technology efficacy, and interviewing principals regarding the participants selected from their individual schools.

Sources of Data

For the purpose of this study, the researcher used an online questionnaire, interviews, and focus groups to obtain data. The 20-item questionnaire (see Appendix A) was used to measure the perceived ability to utilize technology effectively in the classroom. The five-point Likert-type scale questions were answered with responses that range from strongly disagree to strongly agree. In a case study, questionnaires and surveys offer the benefit of using closed-ended questions to provide data that can be quickly gathered and easily prepared for analysis (Bryman, 2015). In addition to the Likert-type scale questions, the instrument included closed-ended questions to collect demographic information for each participant.

After the participants completed the online questionnaire, the researcher conducted personal interviews and focus groups to gather a deeper understanding of the factors that influence teacher technology self-efficacy. Ten participants were selected for face-to-face interviews and the remaining 10 participants were divided into two focus groups. The open-ended questions that were prepared for each focus group focused on specific elements of technology integration, teacher training, and confidence in computer-assisted instruction (see Appendix C). According to Yin (2017), face-to-face interviews and focus groups are beneficial

in research due to the flexibility in creating questions that directly relate to the problem or issues explored in the case study.

Data Collection

For this study, data was gathered using a three-part approach. The collection of data began with the initial Qualtrics 20-question questionnaire, followed by personal interviews and researcher facilitated focus group discussions. Responses to the 20-question questionnaire were converted to numerical data in order to group the participants according to low, medium, or high technology efficacy. The purposeful sampling allowed the interviews and focus groups to include 10 individuals, which included at least one person from each group; participants from each of the self-efficacy groups were represented in the face-to-face interviews and focus group portions of the study. The researcher did not disclose the grouping method to the participants. The initial questionnaire served as a tool for identifying teachers who have varying levels of technology self-efficacy and are expected to utilize assistive software as a part of instruction.

Interviews. The purpose of conducting interviews with the participants was to gather a deeper understanding of individual perceptions of CAI and TPACK training. Each participant was given a review of the research study and an explanation of the interview process. The 45-minute, semistructured interviews allowed the researcher to ask open-ended questions to probe participants, select topics that are relevant to each individual, and uncover thoughts and emotions that are difficult to express in a group setting. Bryman (2015) described a semistructured interview protocol (see Appendix B) as a list of questions that are specific to a particular topic used in the study. Each interview was audio-recorded and transcribed to support later data analysis procedures (Creswell, 2013).

Focus groups. For a better understanding of the strengths, weaknesses, and developing themes associated with participant responses to the questionnaire, two focus groups were formed. According to Stewart and Shamdasani (2014), the key to successful focus group questioning is creating a discussion that works towards addressing research objectives. The questions for the focus group were peer-reviewed and selected in an attempt to obtain a greater understanding of personal beliefs and feelings about technology in the classroom. Individuals not involved with the case study served a pilot for the finalized group questions. The open-ended questions that were prepared for the focus groups allowed participants to discuss technology integration, teacher training, and confidence in computer-assisted instruction with other participants. The focus groups allowed participants to discuss personal and shared experiences with technology integration, TPACK training, and division support. The researcher reminded the participants of his role as a facilitator in the discussions. The discussions were recorded and transcribed. Participants had the opportunity to review the transcriptions and make changes, corrections, or clarifications to their comments as needed.

Identification of Attributes

This study used qualitative research methods to gain a greater understanding of the influence of teacher technology self-efficacy on computer-assisted instruction in urban elementary schools in Virginia. The key attributes in this study were self-efficacy, technology integration, TPACK, professional development, and computer-assisted instruction. The researcher sought to explore the internal and external factors influencing teacher technology self-efficacy. The goal was to gain an insight into the prior experiences that teachers have had with technology instruction, integration, and training.

Data Analysis Procedures

The methods of data analysis in this study followed Creswell's (2009) model of analyzing the various forms of data collected during research. Qualitative research is a cyclical process in which data collection and data analysis occur simultaneously (Creswell, 2009; Lodico, Spaulding, & Voegtle, 2010). For qualitative analysis, Creswell (2009) recommended the following steps:

1. Data collection (audio recordings and written notes)
2. Preparation (transcribing data and sending transcriptions to interviewees for review)
3. Coding (label data and create categories)
4. Generate a description and theme (detailed rendering of the information)
5. Interpretation (make sense of the data)

Following the initial online questionnaire, a report was generated and analyzed to determine which individuals would be the best fit for the study. This was followed by face-to-face interviews and focus group discussions. The information collected from the interviews and focus groups was digitally transcribed and securely stored in the researcher's password-protected cloud account. The data was then coded and organized according to information related to the earlier identified attributes. Coding refers to the method of systematically arranging information in order to categorize (Saldaña, 2015). Initially, the information was hand-coded by the researcher using a color-based system to represent factors related to self-efficacy, perception, influence, confidence, and training. Following the manual coding process, the researcher uploaded the transcripts to NVivo 12 for Windows for software coding.

Through coding, the researcher organized the data and grouped related content to form themes. The themes helped to develop a more complex analysis of the data collected from

participants. Additionally, the themes represented multiple perspectives and beliefs in an effort to build a narrative of the findings. The use of a questionnaire, face-to-face interviews, and focus groups helped the researcher develop an extensive view of the factors that influence a teacher's technology self-efficacy. Member checking was conducted by the participants to establish credibility and establish data trustworthiness (Creswell & Poth, 2017). The final analysis was securely emailed to the participants to determine if they agreed with identified influences of teacher technology self-efficacy on CAI, whether information was omitted, or if any experiences were misrepresented in any way.

Limitations of the Research Design

Every research study has limitations. In qualitative research, questionnaires present limitations due to the restrictive nature of questioning, difficulty probing answers, and the inability to generate validity and reliability for single surveys (Nardi, 2015; Taylor et al., 2015). Participants received the one-time questionnaire link through email and the researcher only had their responses as data. Specific limitations of this study were that it was unknown if the participants would understand each question, would have other individuals complete the questionnaire, or would face difficulties recalling actions in certain situations. As with other questionnaires and surveys, the self-reporting element of the TPSA could also produce limitations.

The limitations of the interviews in this study were: (a) the time it takes to conduct interviews, transcribe the conversations, and code the information (Nardi, 2015; Spradley, 2016; Yin, 2017), (b) the availability of participants for face-to-face meetings (Nardi, 2015; Vogt, Gardner, & Haeffele, 2012), and (c) differences in participant personalities and perceptions may produce biased responses (Creswell, 2009; Lodico et al., 2010). As with interviews, the use of

focus groups produced similar limitations. Focus groups are ideal for small groups and facilitating interactions that "generate new ideas as respondents build on others' comments" (Nardi, 2015, p. 21). However, focus groups tend to present small sample sizes of a particular area, individuals can dominate the group discussion, and participants may be influenced by what others say rather than voicing their own beliefs and opinions (Creswell, 2013; Nardi, 2015).

Validation

Validity is an important part of all research studies that must be addressed (Yin, 2017). The credibility and dependability of the information included in the study depend on validation. Data collection, analysis, and interpretation in qualitative research differ from the traditional quantitative approach. Rather than testing objective theories by examining relationships between variables, qualitative research explores the thoughts and opinions of individuals or groups for a deeper understanding of a problem (Creswell & Poth, 2017). There are various methods of addressing validity in qualitative studies, which include: triangulation, member checking, and peer review (Yin, 2017). In this study, the researcher used validation methods to ensure quality and trustworthiness. All research methods, instruments, and collected data were checked and validated for this qualitative study.

Credibility. To ensure quality and reliability, all data and information presented in this study were reviewed for accuracy. In addition, steps were taken to maintain confidentiality throughout the research. According to Lincoln and Guba (1985), credibility is important for establishing truthfulness in the findings of a qualitative study. Since qualitative research is based on the thoughts, beliefs, and interpretations of the participants, credibility is a critical part of the validation process. It is crucial that the information presented in the research is supported by reliable data. Credibility was addressed in this study through triangulation of data sources and

data types, receiving feedback from participants, and password protecting information. These methods allowed the researcher to verify information, confirm findings, and ensure confidentiality in efforts to enhance the quality of data in this study.

Dependability. Dependability refers to the accuracy, reliability, and consistency of the research findings. To establish dependability, the researcher ensured the research procedures were properly documented. Likewise, the research process was evaluated and critiqued through the peer-review process. The TPSA had been tested and considered a reliable test of technology self-efficacy. This instrument was used in numerous past studies to explore teacher technology self-efficacy in instructional practices, classroom management, and student engagement. Member checking allowed participants to review the data and findings to establish accuracy and rigor in the study (Creswell, 2013).

Ethical Issues in the Study

In a research study, ethical issues are important and require careful consideration. While developing this study, the researcher formulated a clear plan that involved acquiring prior approval for the site and participants, properly collecting and storing data, and maintaining participant confidentiality (Silverman, 2016). There was no conflict of interest in the study because the researcher served as a grant manager for the target division and had no working relationship or communication with any of the participants. The researcher followed the ethical guidelines set forth by the Concordia University–Portland Institutional Review Board (IRB). An informed consent form was delivered and signed by all participants. By signing the consent form, the participants agreed to be involved in the study and have their rights and information protected. At any point during the study, the participants had the right to leave and not be included in the research. All collected data, including questionnaire results, recorded interviews,

and transcripts were stored in a secure location throughout the study and will be destroyed after three years. At the conclusion of the study, the results and summaries of data were made available without identifying information linking participants to the research. The researcher signed the consent form along with the participants and was held accountable for maintaining ethical and confidentiality standards.

Chapter 3 Summary

Teacher self-efficacy has been identified as an important factor in the effective education of students (Bandura, 1997; Kao et al., 2014). Self-efficacy directly influences the willingness of teachers to consistently share knowledge and pass on skills that they acquire through training to students in the classroom (Runhaar & Sanders, 2016). While there have been numerous past studies concerning teacher self-efficacy (Elliott et al., 2010; Khan et al., 2015; Miles, 2013; Schwarzer & Hallum, 2008; Tschannen-Moran & Woolfolk Hoy, 2001), limited research is available on the technology aspect of teacher self-efficacy. In this chapter, the researcher identifies the methods that were used to explore the relationship between teacher technology self-efficacy and the use of computer-assisted instructional practices. The proposed steps in this chapter outline the details of the study including methodology, design, population sampling, sources of data and data collection, data analysis, possible limitations, and ethical issues. The steps outlined in this chapter were followed by the researcher to address the central research question.

A request for permission to conduct research was presented to division administrators of an urban school division that utilizes TPACK training for elementary school teachers. Permission was granted and the questionnaires were distributed to 200 possible teachers in order to select 20 participants for the study. Each selected participant was contacted by the researcher

and provided an informed consent form as evidence of their permission to be included in the study. Focus groups and personal interviews were conducted as part of the study. All data collected from the initial questionnaire, interviews, and focus groups, were transcribed and securely stored to maintain confidentiality throughout the study. The data were coded and organized into themes. Triangulation was used to facilitate the validation of data through cross verifying the information (Creswell, 2013). The researcher followed ethical procedures in all areas of the study. Chapter 4 presents the data that was collected in this exploratory case study of teacher technology self-efficacy.

Chapter 4: Data Analysis and Results

Introduction

The purpose of this study was to identify how teacher technology self-efficacy influences the use of computer-assisted instruction in urban elementary classrooms in Virginia. This study is based on the framework of Bandura's (1994) social cognitive theory and TPACK (Mishra & Koehler, 2006). Bandura (1997) believed learning occurs through observation, imitating, and modeling. He determined that self-efficacy influences confidence, motivation, and performance. According to Bandura (1997), teacher self-efficacy is an individual's belief in his or her ability to successfully complete tasks or achieve goals. This study addressed the following research question:

RQ: How does teacher technology self-efficacy influence computer-assisted instruction in urban elementary schools in Virginia?

In this chapter, the presented data and summary fully address the research question. The instruments used in this study included a questionnaire, interviews, and focus group sessions. The TPSA was used to determine the teachers' technology self-efficacy level. Face-to-face personal interviews and focus groups were conducted to answer the research question. The results of this case study offer information that can be shared with teachers and educational leaders across the Commonwealth of Virginia and beyond as to how teacher technology self-efficacy influences classroom instruction and learning in urban elementary schools. As requested by the host division, the findings will be shared with the Central Office Data and Research team before providing copies of the findings to public and private elementary schools located in urban areas throughout Virginia. The purpose of sharing the information is to help educational leaders understand how teacher technology self-efficacy influences the use of computer-assisted

instruction in urban elementary classrooms. Moreover, the researcher hopes the findings help educational leaders understand what is needed to improve teacher effectiveness in technology education.

An exploratory case study consisting of 20 core content area teachers from 16 urban elementary schools in Virginia was used for this study. The 16 elementary schools were identified as having a large low-income student population making them eligible to receive Title I funds. Additionally, 100% of students at each of the schools receive free or reduced lunch. After permission was granted by the division for research and site communication, the researcher contacted the division Information and Technology departments to begin the recruitment process. Emails were sent to 200 elementary teachers who met the requirements for this study. In total, 46 teachers responded and 28 completed the Qualtrics TPSA questionnaire using the link provided in the recruitment email. The process of communicating with principals, distributing the questionnaire link, and collecting completed forms took much longer than was expected. Following the timeline, the researcher should have had the completed questionnaires collected and scored in three weeks; it took two months to complete. Scheduling the 10 personal interviews and the two focus groups was a much easier process. All the interviews were completed within two weeks and the focus groups were held on the following Saturday.

Description of the Sample

This case study included a diverse group of participants from different age groups, educational backgrounds, ethnicities, and gender. Each participant in this study is a licensed teacher in the state of Virginia and teaches core academic subjects in urban elementary classrooms. From the individuals who voluntarily completed the Qualtrics TPSA questionnaire, purposeful sampling was used to select the individuals to participate in the interview and focus

group portion of the case study. The sampling strategy was purposeful to ensure diversity among participants. To develop an in-depth analysis of teacher technology self-efficacy in the urban elementary setting, the researcher selected participants who are different in ethnical background, age, and levels of experience. The researcher reviewed each participant's demographic information provided in the Qualtrics TPSA questionnaire for similarities and differences. The participants were grouped according to gender, age, ethnicity, and experience. This process allowed the researcher to select male, female, and nonbinary participants with differences in ethnicities and years of teaching experience.

The target division was selected for this study based on its classification as an urban school division by the National Center for Education Statistics External (NCES). According to NCES, all schools fall into four locales by their size, population density, and location in relation to a city. The four locale categories in the NCES classification system are city, suburb, town and rural. For the city category, urban or inner city schools have become the common terms because the schools are typically located in densely populated areas with diverse populations and various ranges of socio-economic backgrounds (Schaffer, White, & Brown, 2018). Adebisi et al. (2015) and Kormos (2018) identified gaps in technology use and instructional practices supported by technology in urban schools in comparison to their suburban and rural counterparts. During the selection process for interviews and focus group participants, two teachers elected to drop out of the study. These individuals were replaced with teachers who met the requirements of the study and scored in similar ranges on the Qualtrics TPSA questionnaire. With the changes, the number of schools represented in the study decreased from 17 to 16. Three of the elementary schools had two teachers participating in the study. All 16 schools represented in the study receive federal, state, and local assistance for serving low income, high poverty communities in Virginia.

The participants in this study met the required specified qualifications of being employed as first, second, third, fourth, or fifth-grade reading, science, history, and math teachers in urban elementary schools in the division targeted for the study. The sample included teachers of various levels of experiences ranging from five to 22 years of experience at the elementary level. While the study required participants to teach at least one core academic subject, many of the participants reported teaching two or more. Twenty-six teachers voluntarily completed the Qualtrics TPSA questionnaire. The researcher used the stratified purposeful selection approach based on TPSA scores, age, gender, race, and experience to identify 20 participants for the study. From the selected individuals, 10 participants agreed to personal interviews and 10 participants agreed to participate in focus group discussions. The two focus group discussions contained five participants. According to Silverman (2016), researchers tend to make sampling choices that enable them to gain a deeper understanding of the phenomenon they are studying. For this study, a small sample of certified core content teachers was used to explore beliefs and perceptions of technology instruction and professional development as they relate to teacher self-efficacy.

Prior to beginning the study, the researcher met with division administrators to secure permission to conduct the study. The application for external research (see Appendix A), was submitted by the researcher and the research study was approved. Email notifications of the research approval were sent to all principals of elementary schools meeting the parameters of the study. Next, the researcher sent emails to all elementary school teachers working in the schools identified as qualifying for the study. The invitation email (see Appendix E) described the study and informed participants of the purpose of the study. Additionally, participants were made aware of the methods of data collection and the steps that would be taken to maintain confidentiality throughout the study.

Questionnaire results. Two weeks after the invitation emails were sent out, the initial Qualtrics TPSA Questionnaire was distributed to 200 qualifying teachers working in schools located in the target division classified as urban elementary schools. The overall response rate was 23%, with 26 teachers of the 200 qualifying teachers completing the questionnaire. The initial five questions on the TPSA questionnaire were included to collect demographic data for each participant (see Table 1). For grouping purposes, each of the 20 items on the questionnaire used a five-point Likert scale. Each descriptor was assigned a point value: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree. Participants' questionnaire results were organized into three categories using the previously mentioned assigned point values: low-to-medium technology self-efficacy totaled within the point range of 50–69, medium-to-high technology self-efficacy totaled within the point range of 70–89, and very high technology self-efficacy totaled within the point range of 90–100.

Of the 26 completed questionnaires, four of the respondents were in the low-to-medium range, 13 of the respondents in the medium-to-high range, and nine of the respondents fell in the very high range. Additionally, 17 of the respondents were female, eight were male, and one participant identified as nonbinary. Female respondents scoring in the low-to-medium range consisted of four individuals, while seven female respondents scored in the medium-to-high range and six female respondents scored in the very high range. Five male respondents scored in the medium-to-high range, while three of the male respondents scored in the very high range and no male respondents scored in the low-to-medium range. One participant identifying as nonbinary scored in the very high range.

Table 1

Demographic Data for Qualtrics Questionnaire Responders

Elementary School Teachers	Number of Responders
Grade Level	
First Grade	4
Second Grade	5
Third Grade	3
Fourth Grade	5
Fifth Grade	9
Gender	
Male	8
Female	17
Nonbinary	1
Race/Ethnicity	
Black or African American	15
White/Caucasian	9
Hispanic, Latino or Spanish Origin	1
Asian	1
Age	
25–34	10
35–44	8
45–54	4
55–64	3
65–74	1
Years of Teaching Experience	
0–10 Years	12
11–20 Years	9
21 Years or Greater	5

Research Methodology and Analysis

The single exploratory case study methodology was used in this study to gain a better understanding of the influence of teacher technology self-efficacy on the use of computer-assisted instruction. The following research question guided this study:

RQ: How does teacher technology self-efficacy influence computer-assisted instruction in urban elementary schools in Virginia?

Self-efficacy was the central phenomenon that the researcher explored for deeper understanding. The researcher used Creswell's (2009) analysis procedures for personal

interviews and focus groups. The first step was data collection. The researcher compiled audio recordings and written notes from each interview, and both focus group sessions. Preparation was the second step in the analysis procedure. This step consisted of transcribing the data, reviewing the transcriptions for revisions, and sharing the transcriptions with participants for their review and approval. Coding the transcriptions was step three in the analysis process. The researcher created categories, labeled the data, and combined or eliminated categories as needed during this step. Next, the researcher generated themes. During this step, common themes were noted, and major themes were established from identified patterns. After the major themes were established, the researcher then related the major themes to the research question. Interpretation was the final step in the analysis procedure. The researcher searched for meaning by comparing the findings with information gathered from previously reviewed literature and theories. This comparison allowed the researcher to develop questions that need to be asked in the future and make suggestions to educational leaders looking to improve teacher effectiveness. The following sections provide greater detail of the steps the researcher used for data collection, preparation, coding, theme development, and interpretation throughout the study.

Interviews. Following the questionnaire phase of the study, individual interviews were scheduled with 10 participants to collect data about the research question. Participants from each of the self-efficacy groups were strategically selected to ensure low, medium, and high self-efficacy participants were represented in the interviews and focus group discussions. Each interview was conducted face-to-face outside of school hours at the participant's school. The interview questions (see Appendix B) were emailed to the participants before the interview and copies were available when the interviews took place. At the beginning of each interview, the researcher reviewed the signed consent forms with the participants and set a timer for 45

minutes. The interviews were recorded using Voice Recorder for Microsoft and Android mobile. All interviews were scheduled and completed within two weeks. After each interview, the digital files were uploaded to the researcher's password-protected cloud account and securely stored until they were transcribed. After the interviews were transcribed, the participants were securely emailed a copy to review for errors, updates, or redactions.

Focus groups. Upon completion of the personal interviews, focus groups were convened. The focus groups were limited to five participants. The participants for the focus groups agreed to participate in the interview or focus group portion of the study. The list of participants was created through purposeful selection. Teachers from all three self-efficacy groups—low-to-medium, medium-to-high, and very high—were present in both focus group discussions. Likewise, the heterogeneous groups were comprised of participants of various ethnicities, ages, and years of teaching experience. Focus Group 1 and Focus Group 2 were conducted on the same day at one of the division elementary schools. A total of 10 teachers participated in the one-and-a-half-hour focus group discussions. Like the personal interviews, the focus groups were recorded using Voice Recorder for Microsoft and Android mobile and uploaded to the researcher's secure cloud storage. The reviewed and edited versions of the transcriptions were securely emailed to participants of each focus group for review. With no edits or updates needed, the transcriptions were prepared for coding.

Coding and analysis of the TPSA questionnaire. The initial analysis of the data was gathered through grouping and sorting data that directly related to the research question. Using Saldaña's (2015) coding methods, the researcher used the Qualtrics TPSA questionnaire to gather important points. As First Cycle methods, Provisional Coding and Values Coding were used to create a "starting point" of codes and measure participant's values, attitudes, and beliefs

about selected topics (Saldaña, 2015). According to Creswell (2009), Provisional Coding begins with a researcher generated list of codes related to the data, while Values Coding considers the participants' inferred values and beliefs. The researcher used these methods of analysis to focus on teacher perceptions related to their technology self-efficacy and the use of computer-assisted instruction while developing themes and identifying common patterns.

Each participant who completed the Qualtrics TPSA questionnaire and gave consent to be included in the study was notified that the initial phase of the study was completed. The participants were informed of the procedures the researcher would take to provide confidentiality of information collected from the research. Pseudonyms were assigned to participants to maintain anonymity. From the questionnaire, self-efficacy the participants have in using technology as an instructional and learning tool was determined. The researcher used ratings to report the data collected from the TPSA questionnaire responses. The ratings were calculated by adding the total number of points participants received by answering each specific Likert indicator. For example, one respondent, Gail, fell in the low-to-medium technology self-efficacy range totaled 58 points or a rating of 58 on the self-efficacy scale.

Coding and analysis of personal interviews and focus groups. Following the analysis of the TPSA questionnaire responses, the researcher used purposeful sampling for the personal interview and focus group discussions. Interview and focus group participants were selected to reflect a variation in self-efficacy scores, age, gender, race, and experience. The stratified purposeful approached allowed the researcher to capture a heterogeneous group of participants to identify characteristics that may influence how self-efficacy changes. Stratified purposeful sampling lends credibility and allows for comparison (Patton, 2015). Once the participants were given pseudonyms, the TPSA questionnaire data were reviewed. The researcher organized the

participants according to demographic responses to facilitate grouping for the next phase of the study.

First, participants were grouped according to their self-efficacy scores collected from the TPSA questionnaire. Data collected from personal interviews and focus groups were recorded using the aforementioned Voice Recorder software for Microsoft or Android mobile. Interview and focus group discussions were transcribed using Scribie, an online transcription service. After receiving the transcriptions, the researcher reviewed each document and made corrections as needed. The completed versions of the interview and focus group transcriptions were shared with participants for their review. Each participant approved the transcriptions and the researcher began the coding process. The initial coding was done by hand using colored highlighters. The researcher completed a thorough read and line-by-line coding of each transcript to extract themes. After the hand-coding process, the researcher uploaded the transcripts to NVivo 12 for Windows for software coding.

Common themes. The researcher began with a short list of provisional codes: *technology, knowledge, perceptions, beliefs, fears,* and *ideas.* Three major themes emerged from the initial coding of the transcripts. The coding and analysis process revealed that common themes developed among the participants, regardless of their technology self-efficacy level. This section describes the themes and subthemes shared by participants of various technology self-efficacy levels. Through face-to-face interviews, the researcher had the opportunity to ask each participant questions about their experiences using technology as an instructional tool in their classrooms. The interview questions were designed to gain a deeper understanding of how self-efficacy levels, training, and resources impact computer-assisted instructional practices in urban elementary schools. From each question response, the researcher identified and highlighted

common themes in the margin. The reoccurring themes found in the interview and focus group discussions were *teacher attitudes, technology training and professional development*, and *organizational support and resources.*

The NVivo 12 for Windows application allowed the researcher to analyze factors that influenced participants' technology self-efficacy levels. Moreover, this allowed the researcher to explore the reoccurring themes that emerged from the initial analysis of the TPSA questionnaire, personal interviews, and focus groups. The researcher saw this as an opportunity to gather more information on the reoccurring themes concerning the influence of teacher technology self-efficacy on computer-assisted instruction in urban elementary schools in Virginia. The NVivo word frequency query of each interview and focus group discussion showed that the words *technology, teaching, students, computer, integration, resources,* and *training* were used the most. The word *technology (attitudes, fears, and beliefs)* was used 124 times during personal interviews and focus group discussions; the word *teaching* was used 86 times; *students* was used 68 times; *computer* was used 57 times; *integration* was used 54 times; *resources* was used 49 times; and *training (professional development)* was used 42 times.

The researcher noted that the term *core (content)* appeared 34 times in connection with teaching, 28 times in connection with integration, and 22 times about training. In with the word computer, the term *device (handheld, digital)* appeared 18 times in the reports. Additionally, the term *time (lack of)* appeared 66 times in connection with technology, teaching, integration, and training. In total, 12 reports with 218 subcategory nodes were created using the NVivo 12 for Windows software. The personal interview questions consisted of 10 files with 168 subcategories and the focus group discussion questions consisted of two files with 50 subcategories. After running the NVivo 12 queries, the researcher thoroughly reviewed each

report and organized the data in a manner to analyze the information as it relates to the research question.

Summary of Findings

In this exploratory case study, the researcher explored the influence of teacher technology self-efficacy on the use of computer-assisted instruction in urban elementary classrooms in Virginia. Overall, the study found that teachers believed that technology self-efficacy had a major influence on the use of computer-assisted instruction in their classrooms. The teachers believed that professional development and TPACK training are ways to increase technology self-efficacy, but other factors such as the lack of planning time, unreliable resources, and inconsistent support still impact teacher technology self-efficacy. This data was collected through the use of personal interviews and focus groups with the participating teachers. The Qualtrics TPSA questionnaire allowed the researcher to develop three technology self-efficacy groups for the participants: low-to-medium, medium-to-high, and very high. Of the 26 teachers who completed the TPSA, 20 agreed to participate in the interview and focus group portion of the study. Of those 20 teachers, four scored in the low-to-medium range, eight scored in the medium-to-high range, and the remaining eight scored in the very high range.

Three distinct major themes with 12 subthemes were found in the data as it related to the research questions. First, the researcher found that internal factors influenced the participants' technology efficacy and their perceived ability to use computer-assisted instruction effectively. This included fears and beliefs associated with the lack of training, basic computer skills, students' perceptions of computer-assisted learning, and overuse of technology in the classroom. Teachers believed technology made their instructional practices more effective, but their self-efficacy in using technology influenced their approach to computer-assisted instruction and

learning. Second, the researcher found that participants believed that external factors contributed to their technology self-efficacy levels, particularly those factors that were controlled at the division level. This included few opportunities for technology training, limited time for implementing plans, unreliable or outdated devices, and minimal administrative support. Teachers felt that there were opportunities to create more effective technology-supported learning environments, but external factors reduced their confidence in positive changes being made to increase CAI in their schools. Finally, the researcher found that participants rely on a change in mindset to address internal and external barriers to increasing their technology self-efficacy. Team planning, trainer training, using students as a resource, and promoting changes in organizational practices were ways teachers used a growth mindset to address barriers.

Presentation of Data and Results

Data from this study included responses from the Qualtrics TPSA questionnaire, personal interviews with 10 participants, and two focus group discussions. The data and analysis of the results are presented in this section. In total, the researcher identified 12 codes from the analysis of the collected data. Table 2 provides the major themes and subthemes found from the teacher interviews and focus group discussions.

Table 2

Overview of Themes and Subthemes

Theme Number and Themes Found Across Data	Subthemes
Theme 1 – Urban elementary teachers' attitudes toward teaching with technology is influenced by internal factors such as limited efficacy, fears, and beliefs.	Teacher attitudes Lack of prior knowledge Influence of student interest Overuse of technology Limited training
Theme 2 – Urban elementary teachers face external barriers to teaching with technology through organizational norms.	Lack of time for implementation Unreliable resources Administrative support Planning as a team
Theme 3 – Urban elementary teachers rely on a growth mindset to address internal and external barriers to increasing technology self-efficacy.	Train the trainer Utilizing student experts Promoting organizational change

Teacher attitudes toward technology. Participants in all three groups of self-efficacy levels had similar attitudes towards using technology. Most participants shared positive experiences teaching and learning with technology throughout their educational careers. Nevertheless, some participants discussed barriers and difficulties using technology in their classrooms. There was a shared belief among the participants that technology was a tool and not a fix for ineffective teaching strategies and planning. The researcher began the personal interviews by asking, *"How do you use technology on a day to day basis?"* Each participant explained how the essential responsibilities of their jobs required technology. Several participants discussed using technology in their homes for learning and entertainment. Many of the participants agreed that technology can be used to effectively increase student involvement through digital hands-on activities and projects. In his interview, Ron, a fourth-grade teacher in his 18th year, stated:

> My students see or hear technology and their eyes pop open. No matter if it's early in the morning or late afternoon right before the buses come, students are always ready to

> actively participate when technology is involved. So many of the students in our schools struggle with following the traditional teaching and learning model. Sitting for long periods of time, taking notes, and relying on textbooks is a thing of the past. Students are so in tune with solving problems and making connections while using laptops or tablets in the classroom. They love having the freedom to explore.

Brenda, a third-grade math and science teacher, believed that technology was the key to her success as a first-year teacher. She discussed how using technology to integrate math and science activated a different type of engagement for her students. In her interview, Brenda explained:

> We all know students are different, so we have to teach to their needs. When my students see the laptop cart out in the morning, they are excited and eager to participate. I couldn't imagine not having the resources I use on a daily basis. That would be a disaster! I can see a difference in not only engagement but also behaviors when we are using classroom technology. Classroom management for a first-year teacher is critical. Don't get me wrong, there were occasions that the activities caused the classroom noise levels to rise, but the active learning and problem solving that was occurring was worth the trade. Our children today are inspired through technology and new ways of learning that many teachers have not yet tapped into. We have the responsibility as educators to stay current and understand the power of teaching in the digital age.

When asked interview question number two, "*Can you discuss the computer-assisted instructional programs used in your classroom*?" i-Ready, Imagine Learning, and IXL were consistently named throughout the responses. Although the programs were not required by the division, several participants explained that they were encouraged to use them by their

administrators. “The district purchased the software and made it available for teachers and students to use, so why not take advantage of it” (Kelly). In her interview, Maggie said,

> During the first week of school, I was informed that we would be giving students more access to technology this year in our school. The principal made sure each teacher had working laptops and Smartboards for their classrooms. I was nervous, to begin with. This was my first year using computers for a large portion of teaching and learning. The students caught on real fast and before I knew it, I had all but mastered using the programs myself. I'd be the first to admit that I was skeptical of the 1-to-1 design, but from what I experienced in my classroom this year, I would never go back to teaching without my students having computer and internet access.

While most participants described similar experiences to those of Ron, Brenda, and Maggie, several participants discussed the problems they see with technology in the urban elementary setting. In her interview, Olivia stated, “After teaching for over 20 years, I see students coming to school with shorter attention spans and greater concerns about what's on television or YouTube that in a book” (Olivia). She went on to discuss the problem of noninstructional usage of cell phones, hand-held video games, and tablets in the classroom:

> Children as young as six have cellphones and tablets with them when they come to school now. They are looking to play games and socialize with their friends on the devices. For the most part, they have no intention of using those to learn unless the teacher creates that opportunity.

Lack of prior knowledge. Participants noted they did not have prior knowledge using technology or computer-assisted learning as a child. While many of the participants discussed using technology in the classroom as an adult, the lack of prior knowledge using technology to

learn impacted teachers' ability to confidently plan lessons and activities for students. Several participants agreed that teachers are learning how to use devices and programs as they plan or deliver lessons. Kelly explained:

> There's not too many of us [teachers] who can say that we knew what to do when our schools began taking a more aggressive approach to integrate technology in the classroom. We had heard rumblings of the district going to a 1-to-1 model for years, but when the computer carts started showing up in our classrooms, the anxiety really set in. Personally, I knew that I was not prepared to teach lessons and facilitate activities using computers. I was terrified and not afraid to admit it. On several occasions, I discussed my background with the technology specialist in our building. She offered support, but for a veteran teacher, it was so hard to abandon what had been my way of doing things for over twenty years. Each day was a challenge, but the support ultimately eased my nerves and helped me get over my fears.

Teachers discussed feelings of uncertainty and diminished confidence in their ability to perform their duties as an educator. For many of the participants, the concept of computer-assisted instruction was not discussed or modeled during their pre-service training. For many schools in the target division, computer-assisted instruction is new. Over the past five years, increased efforts to promote technology equity have increased the number of devices and 1-to-1 schools in the division. The researcher found that many of the schools represented in the study had only recently received class laptop carts or fully functional computer labs. Steve said,

> I am very good with computers. Hardware or software, you name it and I can figure it out. Unfortunately, this didn't really help me when I was told that we would be integrating math and science through technology this year. I've never used technology in

that way, so thinking of ways to teach math and science using the devices in my classroom was going to take some time and planning to pull off. The change was pretty sudden and unexpected. One day I had three classroom desktop computers for students to use and the next morning I receive a brand-new cart with 30 laptops for each student. Within a week we had received a one-hour training on using I-Ready and were expected to facilitate student activities each day.

Donna's lack of prior knowledge caused her to question her role as an elementary educator. She explained, "I've never considered leaving teaching until recently. For many of us, technology is a completely new thing. We grew up with typewriters and calculators. For us to be successful, we must be willing to learn alongside students or be left behind."

Influence of student interest. The participants agreed that students play a major role in determining how technology will be used in their classrooms. Each participant discussed children who were not motivated by technology and some who outright refused to use devices for educational purposes. Technology is changing the way the human brain functions (Sousa, 2016). Students are finding new ways to develop meaning from information, so teachers are forced to adapt along with their students. The researcher found that many teachers believed that their self-efficacy is influenced by student participation, success, and overall interest in the activities or lessons they have planned. Additionally, a student-centered approach to teaching with technology relies on strong relationships and the willingness to learn what excites students. Several, teachers agreed that it is easier to motivate students with things they are interested in.

With interview question number nine, the researcher asked, "*How do you handle situations where a student may be against using technology?"* According to Ulysses, a fourth-grade teacher in his 13th year, "Not all kids find computers and that type of stuff exciting. They'd

rather have a pencil, paper, and good book." Zheng, Li, and Zheng (2017) discovered that even students with high technology self-efficacy have times where they are not motivated by computers or learning with digital media. Today, students find themselves using technology on a consistent basis both in and out of school. During Focus Group 1, Amanda explained,

> I believe students get tired of staring at computer screens all day. In some classrooms, the computer cart comes out and a range of emotions spread across the room. There are students who love to work independently and find computer-assisted learning fun and engaging. Then, there are the students who are not particularly excited about computers but would much rather play games and solve virtual problems overwriting. Finally, there are students who cringe at the sight of technology. Believe it or not, there are a few of them and they aren't afraid to tell you that they hate working on the computer. This is why teachers have to create a diverse learning environment that doesn't marginalize the power of digital learning by overuse or poor planning.

Xavier, a second-year first-grade teacher, expressed similar experiences in his classroom. "They get burned out. It doesn't matter that computers interest them, there has to be excitement and newness to the assignments for many students to stay engaged." Evette added,

> Planning for the unknown is always scary. Since we just received a class set of computers this year, I have traditionally used little or no integration of technology in my lessons. This year has been much different. Once confident in my ability to use the computer and Smartboard to deliver an engaging lesson, I learned quickly this year that all it takes is one student who refuses to participate to make an effective lesson seem like a complete waste of time. Their [students] interest in the delivery of the lesson is just as important as their interest in the actual content. We know our students are different in many ways but

keeping them engaged and interested in learning takes a little more than computers and overpriced software.

Overuse of technology. Participants expressed concerns regarding the issue of oversaturating education with technology. There were concerns that technology is being thought of as the When the researcher asked interview question number six, *"What barriers have you encountered using technology in your teaching?"* Janice, a 17-year veteran third-grade teacher, responded,

> I believe it is important for our students to have the 21st-century skills needed to compete in the global market when they graduate from high school and college, but at the elementary level, we sometimes spend too much time and effort focusing on integration and not the fundamentals. Often, we run into problems that are unforeseen but cut deeply into instructional time. For those who consider themselves to be *techies* like myself, we run the risk of devoting entirely too much time trying to fix the issue ourselves rather than going to plan B. Honestly, I believe we create an inconsistent model of instruction and learning due to this approach. During staff meetings, we have had deep discussions about technology impacting curriculum mapping and pacing guides. Don't get me wrong, I'm certain that technology is a positive thing, especially for the students in our high poverty schools, but I would be remiss to not acknowledge there are barriers.

Like Janice's concerns, other participants feared that instructional technology will be relied on too heavily and regarded as a solution to low academic success. Wayne, who has taught fifth grade at the same school for 18 years, expressed his thoughts in a series of questions. Wayne asked,

> Does technology wake up early and plan for the many different learning styles and personalities in our classrooms? Will technology understand facial gestures and subtle remarks of the children who don't understand? Can we rely on a system that first relied on us to make sure it is programmed correctly?

To Wayne's point, all the participants displayed a positive attitude towards using technology as a method of expanding learning, but the barriers they communicated directly influence teacher self-efficacy.

Interview question number seven, "*How does technology influence student learning?*" was one of the questions that the research noted for having the most passionate responses from the participants. For instance, Todd, a 26-year veteran fifth-grade teacher, feared the loss of social skill development due to the nature of many online learning programs. Todd stated,

> I'm not against technology or the idea of teaching with computers and tablets in the classroom, but an important part of early childhood education is the development of key social skills. When students put those headphones on and spend hours of time in their own minds, I feel as if they are losing opportunities to socialize and communicate with others to form new ideas. Just as learning to solve problems independently is important, I believe teamwork and group structured project-based learning opportunities are equally important. My fear is that school will begin to look like a lot of our students' afternoons and nights at home. Children sitting around with headphones on in front of laptops, video games, and tablets with little or no interaction with the world around them. Consider the social-emotional impact of when the technology is not available or breaks during the day. Where will this leave teachers? This is what concerns me.

During the focus group discussions, the researcher found that many teachers felt that pressure from needing high test scores, expectations of parents, and student perceptions of learning with technology all contributed to their willingness to work towards increasing the use of technology in the classroom.

Limited training. Participants said that training had a significant impact on how they approached teaching with technology and using CAI on a more consistent basis. Although each teacher discussed technology professional development, I found that only one division training event occurred over the past year. Several teachers described the training as a workshop that introduced the TPACK and discussed the relationship between content, pedagogy, and technology. The participants all believed professional development and training were necessary to improve their confidence and comfort level with CAI in their classrooms. For example, Van stated that his teaching style has completely changed following the TPACK workshop. Gail and Donna agreed, explaining that their participation in the workshop was an eye-opener. Gail explained,

> I left the training excited and encouraged . . . a far cry from me breaking down in tears the week before when I was told our school would be losing several instructional assistants who typically handled the technology in many of our classrooms. My guy was amazing. He was much younger than me and really connected with the students through his ability to use technology on a level that none of the core teachers could. Not only did he help the students with their projects and presentations, but he was also the go-to guy for us teachers who needed a quick solution to a technical issue or idea to integrate lessons. Losing him was a disaster, but when the district offered training this year, we were all excited.

Donna said, “For the first time in years, professional development was meaningful. Every year all we hear are complaints about the beginning of the year training. This year was much different!” Nancy appreciated the TPACK training, but she sided with a small group of participants who thought the training was not effective. During Focus Group 2, she talked about how the division must make a commitment to staff development. Nancy said,

> One-day workshops and random conferences are going to help us close the gaps. We know where our weaknesses are, so building ongoing, sustainable professional development opportunities only make sense. Many of our schools have an abundance of technology resources now, but few teachers who can effectively use the devices to enhance student learning experiences. Imagine if we had a plan to have all teachers trained in curriculum integration, digital learning, or computer science. I honestly believe our schools would be ranked among the top schools in the state if not the country. The things we are talking about doing, there are schools that have been doing these things for over a decade now. Those are the schools we are being compared to when we look at academic and technology gap statistics.

Lack of time for implementation. Throughout all the personal interviews and focus groups, the lack of time was the subtheme that was shared the most in the participants’ responses. All of the participants shared the belief that in their roles as educators there was never enough time to learn and practice teaching using technology. Participants in all three self-efficacy groups believed that they needed more time to get familiar with devices, plan lessons, and develop skills in digital instruction. Many of the teachers questioned current practices in the field of education that prioritize standardized-test scores, benchmarks, and graduation rates over

strategies that support teachers in educating the whole child. During Focus Group 1, Ingrid, a fourth-year third-grade teacher, explained,

> Third grade is the scary SOL year for students and parents. The amount of stress that tests puts on my students and their families is disheartening. I've literally had a student have a panic attack during the test. Another student got nose bleeds during every single test session . . . the kid had never even had a nosebleed before in her life. Knowing the importance of the tests, most teachers are reluctant to spend any significant amount of time learning new things that will impact instructional time . . . especially in our schools. Every minute has to be focused and purposeful in the environment we teach in. When schools are labeled Comprehensive Support or Targeted, they are under a microscope. For administrators and teachers, there is not much wiggle room. Our livelihood is at stake over test scores and attendance rates while our counterparts are reaping the benefits of teaching in wealthier divisions.

Ron interjected,

> We can't blame others for where they are employed or what groups of kids they get, but I completely understand the point you are trying to make, Ingrid. I've taught in an urban setting my entire career, but my children all went to county schools in a fairly decent area. Don't ever let anyone con you into believing the education here in the city is the same as it is in the county. Their experience is miles apart. There may be some similarities in certain schools—yes, the county does have some pretty rough schools. But overall the academics, behavior, climate, resources, training, and accountability are much better out there. A big part of their success has to do with making time for things that are critical parts of meeting the needs of all students.

Participants agreed that in their current positions they felt that time was always an issue. Additionally, I found that most teachers not only faced time constraints at work, but they also faced a lack of time for essential tasks at home. There was little time at work or home for a teacher to expand their knowledge of CAI, plan engaging integrated lessons, or practice using technology tools to enhance learning.

Unreliable resources. Participants in all three technology self-efficacy levels discussed fears about technology and barriers that they believed existed with increasing the use of instructional technology in their classrooms. Several participants, including two who scored in the very high self-efficacy range, feared broken or inoperable devices during instructional time. In her interview, Quinn stated,

> I love using technology in my classroom, but not a day goes by where I'm not scared to death that something may not work, and my plans ruined. It's happened before and even though I had a backup plan in place while the help desk guy helped resolve my issues, the lesson was not the same. A lot of my students are really motivated by the technology and software we use for reading. Even though they struggle, the self-paced learning management system our school has adopted allows them to gain confidence while working on basic skills. If the system is down or their laptops are having connection issues, I can expect behavior problems or poor engagement from those students.

Fran, a second-grade teacher in her 16th year explained, "I've had the worst luck with technology working consistently in my classroom. It seems like things have a mind of their own sometimes. I feel like we waste so much time waiting on computers to reboot and connect to Wi-Fi networks." Several participants discussed fears related to problems with technology, but for the most part, teachers believed unreliable devices were a barrier that influenced their self-

efficacy in the classroom. I found that participants in the low-to-medium self-efficacy range were more likely to avoid using classroom technology if they found their resources unreliable. In her interview, Evette stated,

> Broken technology is hard for me to deal with. It's not a secret that I'm not the best with computers and things. My students know this, and they are great helpers. Instead of wasting time with devices that don't work, I make sure my students have activities and projects that can be completed with or without the technology. It takes extra time to plan but I have had technology stop working at some inopportune times. Once, the superintendent was invited to our school for a school-wide event. Just as he enters my classroom, the Wi-Fi signal dies, and my students begin losing their cool one-by-one. I vowed to never let that happen to me again. I have definitely improved my trust in technology this year, but I don't see myself relying on it as much as others.

Participants in the medium-to-high and very high self-efficacy groups believed that technology issues caused by faulty or unreliable resources were frightening, but not to the point of potentially avoiding using devices to avoid problems.

Administrative support. Over the past decade, high levels of attrition and migration show that teachers in low-socioeconomic urban elementary schools have left the field of education or moved to wealthier, higher-achieving schools (Simon & Johnson, 2015). Several teachers stated that the lack of administrative support led to a decrease in academic achievement, burnout, and poor classroom conditions in their schools. Participants in all three self-efficacy groups discussed administrative support as a key contributor to their use of classroom technology. Participants in the low-to-medium self-efficacy range believed that additional administrative support was needed to increase their technology self-efficacy. Pamela said,

> My principal has been very supportive in helping me get up to speed with using technology in my lessons. At the beginning of the school year, she informed us that we would be expected to write more technology-rich plans that integrated math, science, and language arts. I believe she understood that many of us have never really done that before, so we have had professional development days dedicated to technology integration and computer-based activities. I feel much more confident than I did at the beginning of the year. Without support from my principal and the technology department, I can't imagine how my year would have gone. I tried to use technology as much as I could, but I will admit there is much more I have to learn.

Lena and Wayne, both in the medium-to-high self-efficacy range, discussed poor administrative support as a factor in their use of technology in the classroom. During Focus Group 2, Lena explained,

> I've asked for time to discuss the technology plan and expectations for new teachers and I still haven't received any feedback. My colleagues told me they have asked the same questions and still haven't heard a word. I'm not sure how what is expected, but I'm doing my best with what I have. I worry about the number of students who are not receiving the correct learning plan or individualized services due to the lack of support.

Wayne interjected,

> That's one of my worries. I'm using computers, iPads, the Smartboard, 3-D printers, and any other device the admins drop off in my room. I have projects and activities to integrate technology into any core subject right now, but I have no guidance on where we are going with this as a school. To be honest, my kids are getting this stuff every day of the week, but I watch teachers across the hall do seated reading groups and timed math

quizzes all day. I'm not criticizing their teaching styles or abilities, but at what point does equity become an issue? When do the administrators look at data, conduct meaningful observations, or review technology usage to build a better understanding of why my students have been exceeding while others struggle on assessments? All these things have to be considered or we will continue to have problems.

Team planning. Urban elementary teachers face difficulties effectively communicating and consistently collaborating with colleagues on technology instruction and learning. Without an effective method of communicating with team members or peers, teachers have little support in increasing technology self-efficacy. Clara shared how her experiences during team planning have helped her learn to accept constructive criticism when it involved lesson plans. "My plans were a big problem. The team helped me understand that their suggestions were not personal but necessary for developing effective plans." Van explained how he sought out team planning last school year after feeling isolated after two longtime members of his team retired.

Van stated,

> After 12 years of working with the same team, I found myself planning alone. We used to take turns with subjects and come up with unique ways to incorporate technology, music, and physical activities into our lessons. I felt like my creativity suffered tremendously while I planned and wrote lessons alone. So, one day after a pretty miserable morning lesson, I walked down the hall and asked two of the new teachers if they would stop by after school. We met that day and have been planning as a team every Tuesday afternoon this year. Instruction feels a lot richer and technology is being used more today than at any point in my career.

The lack of consistent collaboration impacted the use of classroom technology. Participants felt that more thought and planning could have gone into many of their lessons. The lack of team planning led to many of the participants teaching lessons the only way they knew how or in ways that seemed appropriate at the time. In her personal interview, Olivia explained, "After teaching for so many years, you have lessons that you just know how to teach well. I didn't understand how wrong I was until I allowed a team member to integrate technology into some of my lessons."

Train the trainer. Role models play an important role in building self-efficacy. The participants all agreed that they look to replicate the actions of individuals they admire or respect when looking for effective practices and routines to follow. During the focus group discussions, several participants discussed the comfort and satisfaction of being trained by individuals that they were familiar with during the TPACK workshops. Nancy shared, "I was pleasantly surprised to see Zeke leading the technology training session in the fall. I've learned so much from him. He has always been the one I call when I have issues." Lena agreed, explaining that she felt more comfortable learning from someone she knows. "My confidence when way up when I realized the technology team was here to train us."

Todd interjected,

> It's good to know we are making an effort to educate teachers and build capacity through train-the-trainer type professional development. To me, it's the logical approach, especially when we are still facing cuts in personnel and resources due to budget issues. Why would we pay a high-priced company to come to teach us what many of us already know? After my training, I went back to my class and taught my students a few quick things I learned during the session. Just that quickly the training paid off.

Zane stated:

> I can't agree more with Todd. Relationships and trust in the person training you are important. I've worked in a hard-to-staff school for over 12 years now. I watch new teachers come and go. The new teachers are always looking for their source of comfort and familiarity in the veteran teachers. I feel like this is the perfect opportunity to have them trained in critical pieces like CAI and technology integration. That opportunity wasn't there for most of us, so having experienced the first few years with little or no support in certain areas; we can really speak to what they need to know.

Changes in division professional development policies and procedures have offered teachers the opportunity to learn from research-based practices and share the information with their administrators and colleagues through training sessions. All of the participants agreed that learning from peers and trainers who understand their school's climate and culture has helped increase their technology self-efficacy.

Utilizing student experts. Participants believed students were an enormous help in using technology in their classrooms. In many cases, teachers discovered that students were experts in using the available devices or software. The researcher found that several teachers were using students as technology leads in their classrooms. During the focus group discussions, participants showed their excitement about student technology experts.

Lena explained:

> My two techies, Tavaris and Makayla, were a godsend this year. Tavaris made sure the computers were always charged and updated. Before class, he would find out what sites the lessons or activities would need so he could bookmark them for his classmates. Makayla was really good with helping her peers understand activities and projects. She

> was interested in becoming a teacher, so giving her an opportunity to work in an instructional role helped us both. Watching these students and learning from them really helped my technology self-efficacy. Seeing that they had little or no fear of making mistakes inspired me. It helped me understand that the project-based activities encouraged students to take risks. My teaching style has changed drastically since I got my student helpers.

Yannis shared his experiences with student experts supporting his technology teaching and learning. He said,

> I believe I learned more from my students than what the lessons were teaching them. They not only knew how to use the devices and software; they knew how to help their peers understand what was going on. I was amazed to see how confident they were. The students definitely encouraged me to work harder at finding more ways to integrate technology across all content areas.

Promoting organizational change. Division policies, fund allocations, and resource distribution have impacted the use of technology in many urban elementary schools represented in this study. Participants believed that positive changes have occurred due to several teachers voicing concerns to their administrators and central office personnel. The division has implemented new initiatives to support technology integration, train teachers through TPACK professional development, and increase CAI planning time. All of the participants agreed that their technology self-efficacy had improved in some way or another due to changes in division practices. During Focus Group 1, several teachers discussed their experiences with organizational change. Amanda said,

> It's good to know that someone is listening. I know it seems like we [teachers] are always asking for more, but when it involves removing barriers to academic success, there should be no fear of rejection. A few years ago, I had no computers in my classroom. I asked my principal about getting a few computers and he advised me to be patient, the district is working on it. I was patient for three years. Then one day a large white metal box rolled into my room. It was an entire class set of laptop computers! I think I was more excited than the students. I guess we all understood how much more we could accomplish with the use of technology in our classroom.

Ron interjected,

> I remember that day, Amanda. We all felt like we won the lottery. My students were cheering and dancing as the technology crew set up their devices. Teachers in my school were forced to change things up. We found ourselves learning with the students. There were teachers who had no real computer experience, so they had to learn with their students. When we received technology professional development earlier this year, I knew it was another win for our teachers. Things like that usually don't happen unless there has been a major push from teachers and administrators. In any event, my confidence and desire to use technology in my lessons has increased tremendously.

Several participants discussed how they felt limited by the lack of school and division support in the past. Maggie stated, "There are several factors that impact how much I teach with technology, but until recently division training and communication were the top two. All of the participants believed that positive changes are occurring due to their willingness to speak up and discuss their needs with administrators."

Chapter 4 Summary

The purpose of this study was to identify the extent to which teacher technology self-efficacy influences the use of computer-assisted instruction in urban elementary classrooms in Virginia. This study addressed the following research question:

RQ: How does teacher technology self-efficacy influence computer-assisted instruction in urban elementary schools in Virginia?

This chapter represented the results and findings from 26 submitted Qualtrics TPSA questionnaires, 10 face-to-face personal interviews, and two focus group discussions. The participants offered rich, detailed answers to the personal interview and focus group questions. Participants described how their self-efficacy influences the use of technology in their classrooms. Each teacher described how their technology self-efficacy beliefs were molded through experiences, as well as internal and external factors. The data analysis revealed three major themes that addressed the central research question:

- Theme 1—Urban elementary teachers' attitudes toward teaching with technology is influenced by internal factors such as limited efficacy, fears, and beliefs.
- Theme 2—Urban elementary teachers face external barriers to teaching with technology through organizational norms.
- Theme 3—Urban elementary teachers rely on a growth mindset to address internal and external barriers to increasing technology self-efficacy.

Especially among participants in the low-medium technology self-efficacy range, internal and external factors influenced their attitude towards CAI and technology in their classrooms. Teachers used various strategies to manage internal factors and improve their self-efficacy and use of CAI in the classroom, regardless of their self-efficacy range. Likewise, teachers discussed

the external factors that create barriers to using technology in the classroom. These barriers were mostly controlled by policies, practices, or procedures the division or school administrators have in place. Participants in the very high technology self-efficacy range demonstrated greater effectiveness under the external influences. Their background knowledge and confidence allowed them to work more efficiently and use alternative methods to solve the problems they encountered. All of the participants believed that increasing technology self-efficacy required a growth mindset. Teachers were looking for changes in the division and school practices that promote learning technology skills that translate into increased confidence and improved student support. The participants identified the use of student technology experts as a key example of changing practices to facilitate an increase in CAI and teacher technology self-efficacy. Teachers in all self-efficacy groups experienced self-efficacy increases through additional planning time, purposeful TPACK training with peer trainers, and communication to promote organizational changes that support teaching and learning with technology. The implications of these findings and suggestions for future areas of exploration will be discussed at greater length in Chapter 5.

Chapter 5: Discussion and Conclusion

Introduction

The use of technology as an instructional tool has increased dramatically over the past decade (Ghareb & Mohammed, 2017; Hwang et al., 2015; Rose et al., 2017). Yet, teachers are facing challenges in meeting the needs of all students while implementing division and school-level technology integration practices. While additional funding has allowed many schools to increase the availability of technology, teacher inexperience, poor planning, and the lack of time for implementation remain the greatest factors in unsuccessful technology integration. In Virginia, urban elementary schools continue to have the lowest test scores and highest rates of absenteeism and incidents of disruptive behavior (Virginia Department of Education, 2018a). Although additional state and federal funds have been set aside for these schools, they continue to have higher absentee rates, more reported behavior incidents, and lower performance on Virginia SOL tests.

The purpose of this study was to explore teacher technology self-efficacy and how it influences computer-assisted instruction in urban elementary schools in Virginia. The participants in this study described their experiences using technology and provided insight into how self-efficacy influenced the use of computer-assisted instruction in the urban elementary setting. The study provided an opportunity for urban elementary educators to express their views on the factors influencing the use of technology in the classroom.

The teachers were all elementary teachers who taught core academic subjects and had access to computers, tablets, or similar technology in their classrooms. This initial questionnaire data were used to collect demographic data and determine which participants would be selected

for the interview and focus group phase of the study. Participants were selected using purposeful sampling to ensure a wide variance in technology self-efficacy was represented in the study.

Participants in the qualitative phase of the study included 20 teachers with access to classroom technology. Three self-efficacy groups were formed based on data collected from the TPSA questionnaire. The low-to-medium and medium-to-high groups each included eight teachers, while the very-high group included four teachers. From those groups, participants were placed in face-to-face interviews and focus groups purposefully to ensure representation from all three self-efficacy groups. Data from interviews and the two focus group sessions were coded, analyzed, and organized based on the major themes that supported the research question: How does teacher technology self-efficacy influence computer-assisted instruction in urban elementary schools in Virginia?

The findings presented in Chapter 4 satisfied the research question. The results of this study add to the limited body of knowledge relating to teacher technology self-efficacy. In this final chapter, the researcher will present key findings and implications drawing from the existing theoretical framework. The study is concluded with a discussion of the limitations along with suggestions for educational leaders and future directions in the area of technology self-efficacy and TPACK training.

Summary of the Results

This exploratory case study intended to explore teacher technology self-efficacy and how it influences computer-assisted instruction in urban elementary schools in Virginia. For this study, 20 elementary core content teachers were selected from the target school division. To be included in this research, participants had to teach first through fifth-grade math, language arts,

science, or history in the target division and have access to classroom technology such as desktop computers, laptops, or tablets.

The sources of data collection used in this study included a questionnaire, semistructured interviews, and focus groups. Before conducting the interviews and focus groups, the researcher utilized the TPSA questionnaire designed to measure the self-efficacy of technology use for a group of 200 teachers within the selected school division. Twenty-six teachers responded to the research invite and completed the questionnaire. The responses to the 20-question questionnaire were used to group the participants according to low, medium, or high technology efficacy. Purposive sampling was used to select 20 participants from the three groups of participants. From the 20 participants, the researcher selected 10 teachers for 45-minute face-to-face interviews. The remaining 10 participants participated in the focus group portion of the study. Each focus group contained five participants and lasted one hour and thirty minutes.

The data collected from the questionnaires, interviews, and focus group sessions were analyzed using Creswell's (2009) model of analyzing various forms of data collected during research. Provisional and Values coding were used to create a "starting point" of codes and measure participant's values, attitudes, and beliefs about selected topics (Saldaña, 2015). For the initial coding, the researcher completed a thorough read and line-by-line hand-coding of each transcript to extract themes. After the initial coding, the transcripts were uploaded to NVivo 12 for Windows for software coding. This process provided an opportunity to delve deeper into the reoccurring themes that emerged from the initial analysis of the TPSA questionnaire, personal to interviews, and focus groups.

This study was guided by two frameworks: the technological pedagogical content knowledge (TPACK) and social cognitive theory. The study emphasized gaining a greater

understanding of how teachers perceive their ability to use technology for instructional purposes as well as what training is needed to increase teacher technology self-efficacy. Both internal and external factors were found to have influenced the participants' approach to using technology in the classroom. Additionally, the participants revealed their concerns about professional development and ongoing technology training. The results of the study revealed that the participants' responses to the questionnaire and interview questions presented experiences with classroom technology and training that were valuable to gaining a deeper understanding of teacher technology self-efficacy in urban elementary schools.

In this chapter, each theme is discussed in relation to teacher technology self-efficacy and its influence on the use of computer-assisted instruction in urban elementary schools. The three major themes and supporting subthemes revealed similarities and differences between teachers with varying levels of technology self-efficacy and TPACK training. This data was used to discuss the relevance of the study's findings to current professional development and training practices in urban elementary schools. Additionally, provided in this chapter are recommendations for training and support for teachers of all self-efficacy levels who are looking to gain confidence in using computer-assisted instruction.

Discussion of the Results

In this case study, internal and external factors influenced the participants' self-efficacy levels and their perceived ability to use computer-assisted instruction effectively. The results showed that participants with higher technology self-efficacy were more confident and willing to explore alternative methods of using technology as an instructional tool. Participants with low-to-medium levels of technology self-efficacy found comfort in more traditional methods of instruction such as teacher-centric, direct, or guided learning. The four participants in the low-to-

medium group discussed using technology primarily for communication and documentation rather than a support tool for student instruction and remediation.

Participants in the medium-to-high technology self-efficacy group used technology regularly during classroom instruction, but all agreed that barriers exist that impede the effective use of the technology. Six of the eight participants in the medium-to-high group discussed restrictive policies as barriers to effective technology integration. Four participants explained that in their schools, teachers were not allowed to access web-based resources, instructional materials, and content relevant media that other teachers in the division found valuable. Moreover, two participants reported working in a school that strongly supported technology integration but implemented a technology plan that was improperly aligned with the pacing chart and Virginia state standards and assessments. According to the Virginia Department of Education (2018b), math, science, language arts, and history SOL assessments include items that are technology-enhanced and require students to demonstrate skills in decision making, critical thinking, and problem-solving that are developed through technology-rich learning environments.

The eight participants in the very high self-efficacy group all expressed concerns over teacher technology training and development in the division. Each participant discussed taking technology courses, receiving specialized training, or participating in sustained professional development as factors in their ability and comfort using technology in the classroom. One participant stated that he was a career-switcher who served in the Army as an information technology specialist and a software developer for a small business. He discussed learning the basics of technology at an early age but stressed the importance of ongoing training to build the advanced skills that are needed to implement effective programs. Four participants in the very

high group stated that they attend universities that offered a wide variety of technology courses. These participants all agreed that enrolling in digital media, web design, and information systems courses increased their technology self-efficacy.

When asked about division technology training and professional development, the group was split down the middle. Four participants agreed that the technology plan was functional but limited in that it focused too much on the programmatic aspects of the software. The other four participants disagreed and stated that the technology plan was outdated and not aligned with the division's academic curriculum. Nevertheless, all the participants in the very high self-efficacy group agreed that the lack of time for planning and implementation was the greatest factor influencing the use of technology for teachers across the division. Like participants in the low-to-medium and medium-to-high self-efficacy groups, participants in the very high group agreed that more effective computer-assisted instruction equips teachers and students to address the academic problems faced by many of the division's urban elementary schools.

During the face-to-face interviews and focus groups, participants discussed the need for expanded teacher training and professional development that focuses on using technology to address the educational disparities and achievement gaps in their schools. According to the interview and focus group responses, 12 of the 20 participants were not using CAI at effective levels due to technology self-efficacy. However, there was limited research on the influence of teacher technology self-efficacy on the use of computer-assisted instruction in urban elementary schools. Studying the thoughts, feelings, beliefs, and perceptions of urban elementary teachers would support efforts to gain a deeper understanding of teacher technology self-efficacy and the use of technology in Virginia classrooms. This case study attempts to assist in filling the gap in existing research, by focusing on teacher technology self-efficacy in urban elementary schools.

Bandura's (1994) social cognitive theory and the theoretical framework of TPACK guided the study. The results of this study indicated that teacher technology self-efficacy improves over time through meaningful experiences, training, and a curriculum conducive to computer-assisted instruction. Concentrating on the conceptual framework and the research question, the researcher used data collected from research to form the study's conclusions and recommendations.

Perceptions of confidence in computer-assisted technology. During the interview process, the researcher found that many of the participants felt that their confidence played a major role in using classroom technology as an instructional tool. The coding process revealed that only seven of the 20 participants felt confident in their ability to use technology for instruction, remediation, and academic support. Fourteen of the 20 participants were confident in their ability to use technology as of means of increasing productivity in the classroom, 8 of the 20 felt technology improved their time management, and 18 of the 20 stated that their communication improved with the use of technology. The researcher found that participants in the low-to-medium self-efficacy range were more likely to avoid using classroom technology if they experienced problems with equipment, software, or internet connectivity. During the interviews and focus group discussions, eight of the 10 participants in the medium-to-high self - efficacy range and all six participants in the very high range agreed that technology is an integral part of early childhood education and should be used consistently. These participants believed that it is the teacher's responsibility to develop engaging projects and activities through integrating technology across the curriculum. Overall, 16 of the 20 participants discussed using multiple forms of technology each day to support academic achievement. These numbers revealed contrasting perceptions between teachers with low technology self-efficacy and those who felt confident in their ability to effectively use CAI in the classroom.

The initial coding of the responses from the Qualtrics TPSA questionnaire helped the researcher explore the emergent themes of teacher attitudes, technology training and professional development, and organizational support and resources. The personal interviews and focus group discussions provided evidence of the teachers' perceptions of the influence of technology self-efficacy on the use of CAI. In the following section, the participants' thoughts and beliefs are noted about the three major themes and corresponding subthemes.

Teacher attitudes. Internal and external technology factors influence the use of technology in classrooms (Ertmer & Ottenbreit-Leftwich, 2013). In this study, the data indicated that participants' attitudes toward teaching with technology are influenced by internal factors such as limited efficacy, fears, and beliefs. All the participants agreed that personal experience plays a significant role in whether or not technology is used in a manner that supports learning and academic achievement in urban elementary classrooms. During the face-to-face interviews, seven of the 10 participants agreed that teachers who lack confidence in using technology due to negative past experiences are more likely to use printed materials or traditional methods of teaching. In fact, of the 124 references to technology, 36 of those were in connection with fears and beliefs teachers experience when tasked with using technology to present content in a new way. Six participants explained specific events that shaped their beliefs of technology education and its impact on elementary instruction. While 18 of the participants agreed that technology is a strong asset for teachers, one of the participants stated that teachers who are uncomfortable using technology create fewer opportunities for students and increase the digital gap in urban settings.

All 20 participants agreed that technology made their instructional practices more effective. Consequently, their self-efficacy in using technology influenced their classroom practices and routines of using CAI to support academic achievement. During the focus group

discussions, one participant noted that after several years of using technology in the classroom, her ability to create lesson plans and implement computer-assisted instructional strategies significantly improved. A significant factor in whether or not technology integration becomes a consistent practice in the classroom is prior technology experience (Hammonds et al., 2013). When discussing classroom experiences and learning opportunities that included technology, the participants in this study provided numerous examples of using successes and failures to increase their confidence. As revealed in previous studies, confidence or the belief in one's ability to complete particular tasks using technology was identified as a key factor in the degree in which teachers supported classroom instruction with digital tools (Li et al., 2015; Yerdelen-Damar et al., 2017).

Several participants admitted to limiting their use of technology due to personal beliefs, perceptions, and fears. One participant stated that early in her career she experienced several roadblocks and problems with technology that created high levels of stress and anxiety in her personal and professional life. What she experienced not only caused her to avoid using technology for instructional purposes, it created a level of insecurity that changed her once positive perceptions of technology integration to negative perceptions. Another participant stated that he requested technology training when he began teaching at his school but never received it. The following year, he was reprimanded for not using the required software for reading and writing instruction. He stated that a breakdown in communication and limited division resources caused him to miss the TPACK sessions that were offered through the technology department. He eventually registered for summer technology courses to address his limited experience and training in CAI.

The data in this study revealed that all 20 participants determined that past experiences played a major role in a teacher's likelihood of using computers and other devices to support learning. The participants identified a need for administrative support, reliable resources, and additional time for the implementation of technology plans. They noted that computer-assisted instruction and technology integration are division priorities and have been introduced in every elementary school. The urban elementary schools are particularly a focus of division administrators due to the reported SOL deficiencies in reading and mathematics. JLARC (2014) found that students in Virginia's high poverty urban schools rarely score above the state median on math and English SOL assessments, while students in low poverty suburban schools consistently scored above the state median. A general consensus from all participants was that a teacher's attitude towards technology changes based on thoughts, beliefs, fears, and past experiences.

Technology training and professional development. Teachers experience growth and build confidence in maximizing the potential of technology to enhance instruction through TPACK focused professional development (Hofer & Harris, 2017). The participants in this study all agreed that professional development had a positive influence on their sense of technology self-efficacy. During the face-to-face interviews, the 10 participants all discussed training and professional development. One participant recalled a series of TPACK training sessions that focused on integrating technology across the academic curriculum. The instructor provided sample lesson plans and practical activities designed to help students use technology at their own pace to better understand the content. Another participant recalled the same training and reinforced the effectiveness of the instructor and the experiences he had to offer. The software coding, completed using the NVivo 12 application for Windows, revealed 42 references to

training and professional development. All of the participants acknowledged that some form of technology professional development was conducted at their schools. Twenty-three of the 42 references included references to teaching. This data revealed that teachers not only believe professional development is important, they feel that it is an essential part of classroom teaching and instruction.

All 20 participants agreed that keeping up with trends and advancements in technology required independent learning and ongoing professional development. Teachers require proper training to keep pace with advances in technology, integration, and digital learning (Coleman et al., 2016). In an attempt to describe the division technology professional development plan, one participant stated that consistency was the major concern in most school buildings. Several participants described their experiences in the TPACK training offered through the division technology department. These participants noted that their confidence and ability to properly implement the division's CAI plan was greatly improved by the quarterly technology professional development sessions. Moreover, one participant described becoming a school-based technology lead after completing the year-long TPACK professional development program. The 8 participants who had never received division technology training felt that their schools were falling behind in planning, implementing, and evaluating the progress of CAI.

The coding process revealed that in connection with technology, teaching, integration, and training, participants mentioned the lack of time as a major influence. Several of the participants felt that their technology self-efficacy was affected by improper training and poor planning due to time constraints. One participant mentioned feeling unprepared for the division's push to increase technology integration. While the division increased efforts to provide digital

resources and more stable web connectivity, teachers who had not received prior TPACK training experienced difficulties meeting the new expectations.

Discussion of the Results in Relation to the Literature

According to the literature, addressing instructional inequities has become a major focus of educational leaders across the country. Low teacher technology self-efficacy has contributed to the effects of the digital divide in many urban elementary classrooms (Daugherty et al., 2014). Harandi (2015) explained that a technology-driven learning environment that fosters higher levels of student achievement and builds motivation relies on effective computer-assisted instruction and learning. The U.S. Department of Education (2017) reported that billions of federal, state, and local dollars have been used to invest in classroom technology in efforts to improve student academic achievement. In spite of that, students in low-income urban communities have not experienced academic growth at significant levels to close the achievement gap (Leu et al., 2015; Plucker & Peters, 2018). Teachers are a critical element in integrating technology into classrooms. Without proper planning and training, keeping up with advancements in technology and effective integration models can be challenging (Coleman et al., 2016).

School divisions across the country are moving in the right direction by supporting technology education. As initiatives increase and resources improve, students rely on trained teachers who are confident in using technology as an educational asset (Harris & Hofer, 2017). Teachers and students benefit from improved practices and alternative learning strategies when technology is used consistently in the classroom (Kim et al., 2013). According to research, properly implemented technology integration significantly increases student achievement and promotes active engagement in at-risk students (Collins & Halverson, 2018; Darling-Hammond

et al., 2014; Hilton, 2016; Kim et al., 2013). For this reason, school divisions have made increased efforts to build professional development around TPACK (Harris & Hofer, 2017; Koh et al., 2015).

Urban elementary schools in Virginia continue to have the lowest test scores and highest rates of absenteeism and incidents of disruptive behavior (Virginia Department of Education, 2018a). JLARC (2014) found that students attending the high poverty urban schools are more likely to score lower on SOL tests, have higher absentee rates, receive behavior referrals, and change schools during the year. Placing focus on urban elementary teachers in the targeted Virginia division, the researcher sought to explore the influence of teacher technology self-efficacy on the use of computer-assisted instruction. Based on Bandura's (1977) description of self-efficacy, this study emphasized teacher perceptions of their ability to successfully utilize instructional technology and software and sought to answer the research question, "How does teacher technology self-efficacy influence computer-assisted instruction in urban elementary schools in Virginia?"

The results of the study provided the researcher with a deeper understanding of the influences of technology self-efficacy on the use of computer-assisted teaching and instruction in urban elementary classrooms. The perceptions, perspectives, and experiences of the participants provided significant data on the influences of teacher technology self-efficacy and the use of technology to support student learning. The data also provided the researcher with a greater understanding of the need for professional development and TPACK training to support teachers in integrating technology and closing the digital gap. The study's findings provided strong evidence that aligned with Bandura's (1994) theory, which described self-efficacy as perceptions or beliefs in the ability to succeed in specific educational related tasks. Likewise, the study's

findings suggested that the TPACK framework was a contributing factor towards increasing teacher technology self-efficacy in urban elementary classrooms.

Limitations

Researchers noted that limitations can exist in qualitative research that may impact the findings of the study (Silverman, 2016; Yin, 2017). The researcher sought to identify and acknowledge the limitations of the study to make recommendations for further research. While this case study provided a greater understanding of the impact of teacher technology self-efficacy on computer-assisted instruction in urban elementary schools, the study was limited to only teachers in one school division in Virginia. Nevertheless, the school division where the case study was conducted could be representative of other urban divisions with similar demographics across the country. During the sampling and data collection process of the research, the researcher encountered other limitations.

Sampling limitations. Another limitation of this study was the sample size. The researcher limited the participants to 20 elementary school teachers who were selected through purposive sampling. Although the study invitations went out to teachers in 24 elementary schools, the participants were selected from only eight sites identified as urban elementary schools in the target division. Since the target division is very large and contains many more urban elementary schools than were used for this study, the sample does not fully represent the division's urban elementary schools as a whole. Additionally, due to the size of the division and the process used to collect the initial questionnaires, the selection process was time-consuming. The window for participants to complete the TPSA questionnaire was scheduled to close after two weeks. The researcher reviewed the data after two weeks and there were only six questionnaires completed. Email and phone call reminders were made to the schools that had

incomplete questionnaires. Selecting the participants for the study took 10 weeks; six weeks longer than anticipated.

Method limitations. This case study focused on urban elementary school teachers' technology self-efficacy in Virginia. There was no observation of participants using technology or using the integrated model as a part of classroom instruction. Therefore, a limitation of this study was the inability to compare the teachers' perceived technology self-efficacy and confidence to their actual ability to use effectively use technology as an instructional tool. While the TPSA questionnaire allowed the participants to self-report on their use of technology, confidence using technology in select situations, and training experiences, observations could have provided additional insight into factors that influence teacher technology self-efficacy.

Implications of the Results for Practice, Policy, and Theory

The purpose of this study was to identify the extent to which teacher technology self-efficacy influences the use of computer-assisted instruction in urban elementary classrooms in Virginia. The study provided an opportunity for participants to express their thoughts, feelings, and beliefs on teacher technology self-efficacy and computer-based instructional practices. The study also allowed the researcher to explore the relationship between teacher technology self-efficacy and the use of computer-assisted instruction in the classroom. The study provided information on how the participants perceive the need for technology professional development and how the division plans to address the identified problems. Finally, the study provided information on ways to increase teacher technology self-efficacy, confidence in technology integration, and knowledge of the TPACK framework in urban elementary schools. These findings have implications for teachers, administrators, and school divisions seeking to improve technology self-efficacy, integration, and 21st-century learning strategies.

Implications for practice. In most schools, technological tools have become a staple of teaching and learning. Despite this, students in low-income urban communities are not experiencing the same academic gains and benefits from technology as their counterparts (Leu et al., 2015; Plucker & Peters, 2018). While many teachers feel that they have managed to successfully integrate technology, they are typically merging technology with their existing practices and not creating innovative classroom experiences for students (Hofer & Harris, 2017). Educators must be aware of the impact of technology self-efficacy on student learning. Using the results of this study, the researcher offered suggestions concerning how educators can increase technology self-efficacy and confidence to deliver more effective computer-assisted instruction in urban elementary classrooms.

During the study, participants discussed several ways to increase their technology self-efficacy. Three primary methods of increasing technology self-efficacy were identified (a) more focused TPACK training through peer-led team learning, (b) increased teacher communication and collaboration with a focus on CAI, and (c) increased planning, implementation, and reflection time focused on effective integration. The goal of instructional technology is to integrate core academic subjects with innovation, creativity, and problem-based learning experiences (Koehler & Mishra, 2014). With proper training and implementation, TPACK could serve as an effective framework for technology integration (Matthew et al., 2015; Voogt & McKenney, 2017).

The results of this study indicated that the participants who reported having prior TPACK training were confident in their ability to use technology and effectively implement computer-assisted instructional practices. For those teachers with low technology self-efficacy, using the TPACK framework for professional development could introduce various lessons and learning

activities that help build confidence while engaging students through an integrated model. The majority of participants shared the belief that classroom technology and digital resources were above average in their schools. Moreover, all of the participants agreed that division technology specialists were knowledgeable and willing to assist with software, hardware, and connectivity issues when teachers requested support.

The findings of this study suggested that current division structures and work demands may have limited teachers' technology self-efficacy development. Several participants cited school policies and division procedures as barriers to teachers using technology more effectively. Participants felt that the peer trainers were the most effective part of the TPACK training sessions that the division offered. Peer sharing of technical skills and background knowledge can be used to support teachers in the development of TPACK proficiency (Koh et al., 2015). Several studies found that teachers experienced increases in self-efficacy through consistent professional development, peer learning, and collaboration (Harris & Hofer, 2017; Heath, 2017; Pfitzner-Eden, 2016). Positive school culture and supportive leadership as it relates to the use of technology are key elements for the effective integration of technology in urban elementary schools. Expectations about technology use should be clearly defined by administrators. Schools should be prepared to measure, evaluate, and support teachers through the process of fulfilling these expectations and creating a more technology-rich learning environment.

Implications for policy. During the interview and focus group potions of this study, it became apparent that the participants were lacked confidence in educational policies and practices that relate to technology-based instruction. While the participants agreed that the use of technology has increased in their schools, they also acknowledged barriers that influenced their ability to effectively integrate technology across all subject areas. For instance, one of the most

discussed topics was the lack of time for planning, implementation, and review of computer-assisted lessons. Many participants felt that they were given excellent resources and clear goals, but there were no adjustments made at the building level to allow for collaborative planning, development of procedures, and data review.

When planning technology professional development programs, it is important to determine how often, how long, and for what timeframe should teachers meet to develop skills for effective integration (Ertmer et al., 2015). For this reason, planning and communication should be a part of a division-wide plan to increase technology use, particularly in schools that are experiencing gaps in academic achievement. The results of this study revealed that teachers in urban elementary schools feel that technology is an essential part of creating a 21st-century learning environment. The study's results also indicated that teacher motivation to participate in elective professional development and confidence to integrate instructional technology increased with administrative buy-in. Therefore, division and school policies should support instructional technology growth through more intensive training, teacher collaboration, and peer observations.

Implications for theory. The theoretical framework of this study was grounded in Bandura's social cognitive theory and the theoretical framework of TPACK. As a major component of the social cognitive theory, self-efficacy was the main focus of this study. Bandura (1997) discussed self-efficacy as a performance indicator based on an individual's confidence, motivation, and desire to complete a task. Moreover, Bandura's theory suggests that efficacy affects behaviors, performance, and productivity. Since the focus of this study was to explore the influence of teacher technology self-efficacy on the use of computer-assisted instruction, it was appropriate to use Bandura's social cognitive theory.

Concerning the social cognitive theory, the results of the study supported the notion that teachers' beliefs in their abilities have a direct influence on their motivation and practices. Participants agreed that their technology self-efficacy was a product of prior experiences and could be increased with additional opportunities to learn new strategies and collaborate with their peers. These findings were supportive of the social cognitive theory and Bandura's (1994) belief that individuals develop confidence in their skills through relationships, different levels of experience, and observing relevant behaviors. Additionally, the study's results revealed that teachers in urban elementary schools are motivated by changes that support their ideas and beliefs of what it takes to improve learning, growth, and achievement. Administrators should instill policies and best practices by clearly defining expectations about instructional technology use and providing a framework for ongoing technology development.

The results of this study showed that the participating teachers who reported having difficulties implementing the CAI model felt that not enough emphasis was put on the foundational skills needed to effectively use technology to support teaching and learning. The major findings in this study were that teachers perceived their self-efficacy technology use during classroom instruction to be influenced by the amount and quality of support they received. These perceptions led to contrasting levels of technology use among participants in each self-efficacy group. Participants with low levels of technology self-efficacy believed that the lack of quality technical support had a negative influence on their ability to effectively use computer-assisted instruction in the classroom. The lack of TPACK training and technical support resulted in low levels of technology use, limited opportunities for experimentation, and a feeling of anxiety resulting from their responsibility for incorporating technology in the classroom.

Participants with high levels of self-efficacy placed a high value on technology in their personal and professional lives and were satisfied with the levels of support from administrators and division technology personnel. The TPACK framework allows teachers to learn the key components of technology instruction. Applying the TPACK framework to the development of teachers allows them to develop choices about what to content to teach, how to teach it using an integrated model, and what technologies to use (Matthew et al., 2015). Likewise, administrators should understand that applying the TPACK framework should be based on the needs of teachers and the technology resources they will use for lessons. The TPACK framework should be a foundational model used to plan a technology curriculum for teacher education programs and develop engaging student activities.

Recommendations for Further Research

In this section, the researcher makes recommendations to future researchers concerning the influence of teacher self-efficacy on computer-assisted instruction in urban elementary schools in Virginia. The study's limitations and results provide an opportunity for future research. Since instructional technology is a growing concern for many school divisions, particularly those serving students in urban communities, future researchers may find the results of this study valuable when exploring the influence of teacher technology self-efficacy.

The first recommendation would be to increase the sample size to increase the significance level of the findings. While a larger sample size adds the risk of repetitive data, it should more accurately mirror the practices and behaviors of the group. According to Creswell and Poth (2017), the sample size should relate to the research question and the type of qualitative approach used in the study. This study was conducted in a single urban school division in Virginia. By expanding the research to additional divisions, cities, or regions, researchers should

find a sample size that will validate the data by providing more accurate estimations about the population.

Another recommendation would be for future researchers to explore the reasons why teachers are not successfully implementing technology in the classroom and whether it is due to internal factors (personal beliefs, or prior experiences) or external factors (school lacking resources or restrictive policies). Ersoy and Bozkurt (2017) believed that teachers fail at effectively implementing technology when there are insufficient resources, a lack of alignment between curriculum and technology instruction, and limited training opportunities. The results of this study revealed gaps in planning and professional development for teachers who had received new technology in their classrooms. While the division increased funding for technology upgrades and new equipment, many participants believed that they were unable to fully utilize the items in their classrooms without proper training.

Finally, it is recommended that future researchers include principals, division administrators, professional developers, and other instructional staff as participants. By having a broader range of individuals who are equally responsible for implementing technology in the classroom the study may reveal greater opportunities to increase the use of computer-assisted instruction in the classroom. A conversation with these individuals might give insight into why some teachers feel that administrators and support staff influence their ability to increase their technology self-efficacy. As technology plans develop, what teachers need in terms of resources and support changes (Ertmer & Ottenbreit-Leftwich, 2013). When the participants acquired new technical skills and became more comfortable using technology, they believed that their needs shifted, and they required more support from administrators and technology staff to apply those skills in the classroom.

Conclusion

The purpose of this exploratory case study was to explore teacher technology self-efficacy and how it influences computer-assisted instruction in urban elementary schools in Virginia. To gain greater insight into teachers' beliefs and perceptions of technology instruction and professional development as they relate to teacher self-efficacy, this study explored three themes that provided important implications for urban educators. In this study, teacher technology self-efficacy had a major influence on integration and computer-assisted instruction in urban elementary classrooms. While both internal and external factors influenced teachers' attitudes and perceptions towards technology use, teachers with higher levels of self-efficacy were more confident in their ability to use technology to increase academic achievement. Likewise, the results of this study revealed participants who had prior TPACK training had higher self-efficacy than those who had limited or no experience with this framework.

According to social cognitive theory, learning develops from observations and experiences that are continuously influenced by personal, environmental, and behavioral factors (Bandura, 1997). The results of this study supported that these factors directly contributed to the development of teachers' technology self-efficacy. All of the participants agreed that their technology self-efficacy could be improved in many ways. A better understanding of how self-efficacy influences the use of technology may help teachers, administrators, professional developers, and division leadership prepare to close the academic and digital gaps that exist in urban elementary classrooms.

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Appendix A: Teacher Questionnaire

Technology Proficiency Self-Assessment

Welcome to the Technology Proficiency Self-Assessment (TPSA)

Thank you for participating in the survey. Your feedback is important.

Please enter the last four digits of your social security number.

With which ethnic background do you most identify?

White

African-American

Hispanic

American Indian

Asian

Pacific Islander

Other

Are you male, female, or other?

Male Nonbinary Female

What is the grade level at which you currently teach? (Check all that apply.)

1st Grade 2nd Grade 3rd Grade 4th Grade 5th Grade

What is the current subject area in which you teach? (Check all that apply.)

Math

Science

Social Studies

English/Language Arts

Technology Proficiency Self-Assessment Section

In this section, assess your confidence level using technology as:

Strongly Disagree (SD), Disagree (D), Undecided (U), Agree (A) or Strongly Agree (SA)

I feel confident that I could...

* 1. ...send an email to a friend.

SD D U A SA

* 2. ...subscribe to a discussion list.

SD D U A SA

* 3. ...create a distribution list to send e mail to several people at once.

SD D U A SA

* 4. ...send a document as an attachment to an e mail message.

SD D U A SA

* 5. ...keep copies of outgoing messages that I send to others.

SD D U A SA

* 6. ...use an Internet search engine (e.g., Google) to find Web pages related to my subject matter interests.

SD D U A SA

* 7. ...search for and find the Smithsonian Institution Web site.

SD D U A SA

* 8. ...create my own web page.

SD D U A SA

* 9. ...keep track of Web sites I have visited so that I can return to them later. (An example is using bookmarks).

SD D U A SA

* 10. ...find primary sources of information on the Internet that I can use in my teaching.

SD D U A SA

* 11. ...use a spreadsheet to create a bar graph of the proportions of the different colors of M&Ms in a bag.

SD D U A SA

* 12. ...create a newsletter with graphics.

SD D U A SA

* 13. ...save documents in formats so that others can read them if they have different word processing programs (eg., saving Word, pdf, RTF, or text).

SD D U A SA

* 14. ...use the computer to create a slideshow presentation.

SD D U A SA

* 15. ...create a database of information about important authors in a subject matter field.

SD D U A SA

* 16. ...write an essay describing how I would use technology in my classroom.

SD D U A SA

* 17. ...create a lesson or unit that incorporates subject matter software as an integral part.

SD D U A SA

* 18. ...use technology to collaborate with other interns, teachers, or students who are distant from my classroom.

SD D U A SA

* 19. ...describe 5 software programs that I would use in my teaching.

SD D U A SA

* 20. ...write a plan with a budget to buy technology for my classroom.

SD D U A SA

Thank you for your time.

TPSA created by and used with permission of Dr. Margaret Merlyn Ropp, Assistant Professor of Technology Education, University of New Mexico. For additional information or for permission to use the TPSA in other studies, seehttp://www.unm.edu/~megropp/. TPSA v 1.0

Appendix B: Interview Protocol

Teacher Interview Question Pool

1. How do you use technology on a day to day basis (inside and outside of the classroom)?
2. Can you discuss the computer-assisted instructional programs used in your classroom? Are these programs required by the school or district?
3. Have you participated in TPACK training focused on technology integration?
4. What would you change about the technology professional development you have already received?
5. How does technology help your teaching?
6. What barriers have you encountered using technology in your teaching?
7. How does technology influence student learning?
8. What is your indicator that technology is helping students learn?
9. How do you handle situations where a student may be against using technology?
10. Would you like to share any other comments or experiences related to the role of technology in your classroom?

Appendix C: Focus Group Interview Protocol

Teacher Focus Group Interview Question Pool

Focus group questions on teacher technology self-efficacy, confidence using technology for classroom instruction, and TPACK training.

Background Questions

1. What role does technology play in your everyday life?

2. What role does technology play in education today?

Focus Group Specific Questions

3. What factors do you attribute to your self-confidence in using technology in your classroom instruction?

4. Can you describe any professional development or professional learning that has had a positive or negative effect on your self-confidence in using technology in your classroom instruction?

5. What do you believe would help make you more comfortable in using technology in your classroom instruction?

Summary Question

6. How would you describe your attitude toward using technology in your classroom instruction?

Appendix D: Concordia University Institutional Review Board Approval

CONCORDIA
UNIVERSITY

–PORTLAND, OREGON–

DATE:	October 8, 2018
TO:	Randall Johnson, M.Ed
FROM:	Concordia University–Portland IRB (CU IRB)
PROJECT TITLE:	[1245151-2] The Impact of Teacher Technology Self-Efficacy on the Use of Computer-Assisted Instruction in Urban Elementary Schools
REFERENCE #:	EDD-20180711-Graham-Johnson
SUBMISSION TYPE:	Response/Follow-Up
ACTION:	APPROVED
APPROVAL DATE:	October 8, 2018
EXPIRATION DATE:	August 9, 2019
REVIEW TYPE:	Expedited Review

Thank you for your submission of Response/Follow-Up materials for this project. The Concordia University - Portland IRB (CU IRB) has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission. Attached is a stamped copy of the approved consent form. You must use this stamped consent form.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of August 9, 2019.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Amon Johnson at (503) 280-8127 or amjohnson@cu-portland.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Concordia University - Portland IRB (CU IRB)'s records. October 8, 2018

Appendix E: Consent Form for Participants

Research Study Title: The Impact of Teacher Technology Self-Efficacy on the Use of Computer-Assisted Instruction in Urban Elementary Schools in Central Virginia.
Principal Investigator: Randall Johnson
Research Institution: Concordia University
Faculty Advisor: Dr. Donna Graham

Purpose and what you will be doing:
The purpose of this survey is to explore how teachers perceive their ability to use technology as an effective instructional tool in urban elementary classrooms. We expect approximately twenty volunteers. No one will be paid to be in the study. We will begin enrollment on August 27th, 2018 and end enrollment on September 7th, 2019. To be in the study, you will complete the online Technology Proficiency Self-Assessment (TPSA). Afterwards, the principal investigator will conduct 20-minute personal interviews with participants. The study will end with a 45-minute focus group that will be facilitated by the principal investigator. Doing these things should take less than two hours of your time. Interviews and focus group discussions will be recorded.

Risks:
There are no risks to participating in this study other than providing your information. However, we will protect your information. Any personal information you provide will be coded so it cannot be linked to you. Any name or identifying information you give will be kept securely via electronic encryption or locked inside secure storage. When we or any of our investigators look at the data, none of the data will have your name or identifying information. We will only use a secret code to analyze the data. We will not identify you in any publication or report. Your information will be kept private at all times. Recordings will be deleted after the transcription process and all study documents will be destroyed 3 years after we conclude this study.

Benefits:
Information you provide will help build a better understanding of what factors influence confidence in utilizing technology as an instructional tool. You could benefit from the valuable insight the study will provide about beliefs, feelings, and concerns regarding technology integration in urban elementary education.

Confidentiality:
This information will not be distributed to any other agency and will be kept private and confidential. The only exception to this is if you tell us abuse or neglect that makes us seriously concerned for your immediate health and safety.

Consent Form for Participants (continued)

Right to Withdraw:
Your participation is greatly appreciated, but we acknowledge that the questions we are asking are personal in nature. You are free at any point to choose not to engage with or stop the study. You may skip any questions you do not wish to answer. This study is not required and there is no penalty for not participating. If at any time you experience a negative emotion from answering the questions, we will stop asking you questions.

Contact Information:
You will receive a copy of this consent form. If you have questions you can talk to or write the principal investigator, Randall Johnson at [redacted]. If you want to talk with a participant advocate other than the investigator, you can write or call the director of our institutional review board, Dr. OraLee Branch (email obranch@cu-portland.edu or call 503-493-6390).

Your Statement of Consent:
I have read the above information. I asked questions if I had them, and my questions were answered. I volunteer my consent for this study.

_____ _____
Participant Name Date

_____ _____
Participant Signature Date

_____ _____
Investigator Name Date

_____ _____
Investigator Signature Date

Investigator: Randall Johnson email: [redacted]
c/o: Professor Dr. Donna Graham
Concordia University–Portland
2811 NE Holman Street
Portland, Oregon 97221

Appendix F: Statement of Original Work

The Concordia University Doctorate of Education Program is a collaborative community of scholar-practitioners, who seek to transform society by pursuing ethically-informed, rigorously- researched, inquiry-based projects that benefit professional, institutional, and local educational contexts. Each member of the community affirms throughout their program of study, adherence to the principles and standards outlined in the Concordia University Academic Integrity Policy. This policy states the following:

Statement of academic integrity.

> As a member of the Concordia University community, I will neither engage in fraudulent or unauthorized behaviors in the presentation and completion of my work, nor will I provide unauthorized assistance to others.

Explanations:

What does "fraudulent" mean?

> "Fraudulent" work is any material submitted for evaluation that is falsely or improperly presented as one's own. This includes, but is not limited to texts, graphics and other multi-media files appropriated from any source, including another individual, that are intentionally presented as all or part of a candidate's final work without full and complete documentation.

What is "unauthorized" assistance?

> "Unauthorized assistance" refers to any support candidates solicit in the completion of their work, that has not been either explicitly specified as appropriate by the instructor, or any assistance that is understood in the class context as inappropriate. This can include, but is not limited to:
>
> - Use of unauthorized notes or another's work during an online test
> - Use of unauthorized notes or personal assistance in an online exam setting
> - Inappropriate collaboration in preparation and/or completion of a project
> - Unauthorized solicitation of professional resources for the completion of the work

Statement of Original Work (continued)

I attest that:

1. I have read, understood, and complied with all aspects of the Concordia University–Portland Academic Integrity Policy during the development and writing of this dissertation.

2. Where information and/or materials from outside sources has been used in the production of this dissertation, all information and/or materials from outside sources has been properly referenced and all permissions required for use of the information and/or materials have been obtained, in accordance with research standards outlined in the *Publication Manual of The American Psychological Association.*

Randall L. Johnson

Digital Signature

Randall L. Johnson

Name (Typed)

November 26, 2019

Date