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TEACHER PERCEPTIONS OF CURRICULUM-DRIVEN TECHNOLOGY AFTER WORKING WITH INSTRUCTIONAL TECHNOLOGY COACHES IN MIDDLE SCHOOLS IN ONE SOUTHEASTERN SCHOOL DISTRICT

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Dissertation

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of the requirements for the degree of Doctor of Education

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by

Julie Meunier Pepperman

June 28, 2021

Dedication

This work is dedicated to my late husband, Frederick Jules Pepperman, III. You will forever be my hero. This work is also dedicated to my children, Kathryn, Mallory, Olivia, and Grace. Remember you can always rely on the love and support of family. I would like to thank my parents, Fred and Celeste Meunier, and my sisters, Lisette Miller and Colette James, for encouraging me to continue with my dissertation even in my grief.

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Abstract

The use of curriculum-driven technology in K-12 public schools was mandated by federal law. School and district leaders were required to provide curriculum-driven technology professional development and support to teachers. The use of the curriculum-driven technology coach was an option some schools chose to meet the curriculum-driven technology professional development requirements and needs of their teachers. The purpose of this research was to explore one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach. This qualitative study was conducted with participating teachers from three middle schools within one school district located in the southeastern United States. The participants' responses indicated a relationship between working with a curriculum-driven technology coach and their self-perceptions of their ability to use curriculum-driven technology. The participants indicated working with a curriculum-driven technology coach positively impacted their perceptions of the importance of curriculum-driven technology and their ability to integrate curriculum-driven technology to their classrooms.

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Chapter I: Introduction

With the advent of educational films in the early 1900s, instructional technology became a part of education (Olszynko-Gryn, 2016), but instructional technology did not become a federally mandated component of education until educational reform efforts began in the 1980s (U.S. Department of Education, 2001a, 2005, 2009). The U.S. Congress, through the passage of the Every Student Succeeds Act (ESSA) of 2015, required school district leaders to demonstrate they provided students with high-quality digital learning opportunities and provided teachers with ongoing, high-level, instructional technology professional development. The requirements in ESSA highlighted the expanding responsibilities placed on administrators to be instructional technology leaders and the increased importance placed on effective instructional technology integration. Davis et al. (2005) stated administrators were expected to be instructional leaders, building managers, and public relations experts.

Administrators were not prepared for the increased responsibility of being a curriculum-driven technology leader and were overburdened by the sheer number of everyday duties (Inan & Lowther, 2010a). Administrators' lack of time and multitude of responsibilities led to the use of instructional coaches to support teachers' efforts to provide high-quality academic lessons using curriculum-driven technology (Ertmer & Ottenbreit-Leftwich, 2010; Inan & Lowther, 2010a, 2010b; Knight, 2009, 2011). This basic interpretive qualitative study was conducted in one southeastern school district by collecting and analyzing data from a web-based questionnaire given to participating teachers from three of the districts' middle schools (grades 6-8).

Statement of the Problem

Ertmer and Ottenbreit-Leftwich (2010) stated technology use in the 21st century was essential to educating students. Technology had become a multidimensional tool that impacted education and almost every other facet of student life (Ross et al., 2010). From the chalkboard of the 1800s and the movie projector of the 1900s to the computer enhanced smartboards and augmented reality headsets of 2020, technology and instruction had been intertwined (Ferster, 2014; Franklin & Bolick, 2007; Fry et al., 1960). Educator use of instructional technology affected positive change in student academic achievement by providing equal access to information for students of all socioeconomic and academic ability levels (Ertmer, 2005; Ferster, 2014; Franklin & Bolick, 2007; Ross et al., 2010; Tamim et al., 2011). Other benefits of integrating curriculum-driven technology to the curriculum include higher levels of student engagement and the ability to individualize instruction to meet the varying needs of all students (Anglin, 2011; Ferster, 2014; Franklin & Bolick, 2007; Ross et al., 2010).

The integration of technology to the curriculum became a federally mandated and an expensive requirement for K-12 public schools in the United States, with approximately 9.5 billion dollars spent on technology in 2015 (McCandles, 2015; Ross et al., 2010; Schaffhauser, 2018; U.S. Department of Education, 2000b, 2001a). In 2019, U.S. K-12 schools spent 28.3 billion dollars on technology (Cauthen, 2021). In 2020, the money spent by U.S. K-12 schools on technology increased to 35.8 billion dollars; 16.6 billion dollars was spent on technology hardware such as computers, 6.1 billion dollars was spent on computer software, and 13.1 billion dollars was spent on digital curriculum (Cauthen, 2021). The International Society for Technology in Education (ISTE) (2016) stated the 2015 ESSA required school district leaders and administrators to have the leadership, management, and knowledge to design, develop, implement, and sustain a school or district-wide digital age learning environment that promoted a shared vision and maximized the use of digital–age resources to meet learning goals and support effective instructional practice. ESSA (2015) also included specific instructional technology integration requirements, for school district leaders and principals, which highlighted the importance of education leaders to the effective instructional technology integration to the curriculum and regulated the government provided technology funding.

Administrators were expected to be instructional leaders, building managers, assessment coordinators, experts of policies and legal matters, safety coordinators, public relations experts, disciplinarians, and technology integration leaders (Davis et al., 2005; Gray et al., 2007; Lashway, 2003; Leithwood & Riehl, 2003; Maxwell, 2015; National Association of Elementary School Principals [NAESP], 2008; Van Roekel, 2008). "As a result, many scholars and practitioners argue[d] the job requirements far exceed[ed] the reasonable capacities of any one person" (Davis et al., 2005, p. 3). Davis et al. (2005) stated becoming a curriculum-driven technology leader was one more responsibility of 21st century K-12 public school principals. In the era of the No Child Left Behind Act of 2001 (NCLB) and its successor ESSA (2015), K-12 educational institutions were subject to federal mandates that increased school administrators' responsibilities to encompass a multitude of new duties (Alvoid & Black, 2014; Davis et al., 2005; Dunham, 2012; ESSA, 2015; Hew & Brush, 2007; Institute of Education Science, 2008; Maxwell, 2015; NAESP, 2008; NCLB, 2002; Van Roekel, 2008). As questions about the extent of the school's administrative leadership's influence on student achievement became an increasingly important research topic, policymakers began placing greater pressures on administrators to successfully perform all the old and new aspects of their jobs (Inan & Lowther, 2010a; Inan et al., 2010).

Part of ESSA's (2015) technology integration requirements included the expectation to effectively integrate instructional technology throughout K-12 public schools. ESSA (2015) expanded the meaning of instructional technology in NCLB (2002) from acquiring computer hardware and internet access to also include integrating curriculum-driven technology, such as digital textbooks, interactive academic websites, and web-based academic assessments (Anglin, 2011; ESSA, 2015; Ferster, 2014; Magana, 2017; NCLB, 2002; Reynolds et al., 2016; U.S. Department of Education, 2016). Districts, administrators, and teachers bore the responsibility to meet the technology expectations of ESSA (ESSA, 2015; ISTE, 2015, 2016). Inan et al. (2010) and Inan and Lowther (2010a, 2010b) suggested most administrators were either not prepared to be instructional technology leaders or did not have the time necessary to provide consistent instructional technology leadership on a personal level with each teacher. School district leaders and principals began to utilize instructional coaches to help bridge the gap between principals' time constraints and their instructional leadership responsibilities to provide professional development support and guidance for teachers (Chaudhuri, 2016; Davis et al., 2005; Dawson & Rakes, 2003; ISTE, 2016; Kowal & Steiner, 2007; Lashway, 2003; Maxwell, 2015; Mead, 2011; Sheng et al., 2017; Sweeney & Mausbach, 2019; Van Roekel, 2008). Instructional technology coaches were one type of instructional coach utilized by school district leaders and principals to provide technology integration leadership to teachers (Carver, 2021; Halter & Finch, 2011). The purpose of this research was to explore one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach.

Research Questions

Research questions have been designed to focus this study specifically on teachers' perceptions of the influence, if any, instructional technology coaches had on teachers' use of and beliefs about curriculum-driven technology. Designing good research questions was essential to obtain informative answers that led to new research or the development of new theories (Alvesson & Sandberg, 2013). The following research questions have been crafted to explore K-12 public school teachers' perceptions of integrating curriculum-driven technology to their academic curriculum after collaborating with a curriculum-driven technology coach.

Research Question 1

What are middle school teachers' perceptions of the relationship between collaborating with a curriculum-driven technology coach and the teachers' beliefs or attitudes about their ability to integrate curriculum-driven technology to the curriculum?

Research Question 2

What are middle school teachers' perceptions of the relationship between collaborating with a curriculum-driven technology coach and the importance of integrating curriculum-driven technology to the curriculum?

Theoretical Framework

The theoretical framework for this study was derived from Bandura's (1971) social learning theory, which evolved into the social cognitive theory by Bandura in 1989. The social cognitive theory proposed humans had the ability to determine their own course of action to produce desired results through the observation and evaluation of others' behaviors and through self-regulating functions (Bandura, 1971, 1977, 1982, 1989, 1999b; Maisto et al., 1999). Bandura developed social cognitive theory to help explain and understand the cognitive processes that occurred within humans that affected their abilities to learn new behaviors or change poor behaviors (Bandura, 1971, 1989; Maisto et al., 1999). Bandura (1989) stated almost all new learning could be acquired through direct experiences or through observing the behaviors and responses of others.

Bandura (1989) identified four principles of the social cognitive theory: differential reinforcement, vicarious learning, cognitive processes, and triadic reciprocity. Differential reinforcement referred to the behavior choices made by human, determined by their environment (Bandura, 1971, 1977, 1989, 1997, 1999a, 1999b; Maisto et al., 1999). For example, it may have been acceptable to scream loudly at a sporting event but unacceptable to do so in someone's home. Vicarious learning was the ability to learn through observing others' behaviors or through symbols such as the written or spoken word (Bandura, 1971, 1977, 1989, 1997, 1999b; Maisto et al., 1999). Cognitive processes referred to the ability of humans to retain, organize, decode, and analyze information received from their environment; to develop conclusions; and to make behavior choices based on those conclusions (Bandura 1989, 1997, 1999a, 1999b; Maisto et al., 1999).

The final principle of the social cognitive theory was triadic reciprocity, originally called reciprocal determinism, which was the belief that the individual, the environment, and the behavior were mutually affected and determined by each other in a never-ending reciprocity relationship (Bandura 1971, 1977, 1989, 1997; Maisto et al., 1999). Bandura (1989) stressed in triadic reciprocity the individual was more important than the environment in predicting behaviors. In conjunction with the individual's importance in the triadic reciprocity relationship, Bandura (1989) determined human self-regulatory functions were the most important factor in human behavior. Self-regulatory functions referred to the human capability to "arrange environmental incentives, produce cognitive supports, and generate consequences for their actions" (Maisto et al., 1999, p 110). Being capable of self-regulatory functions allowed the individual to develop self-efficacy (Bandura, 1982, 1989; Maisto et al., 1999), or an individual's belief that they possessed the skills or knowledge necessary to achieve the desired results regarding a task or problem (Bandura, 1982, 1989, 1997).

Educator professional development, such as working with an instructional coach, was an effort to improve curriculum content knowledge or teacher pedagogy by changing teacher attitudes, beliefs, and practices to affect positive student learning outcomes (Knight, 2009, 2011). Curriculum-driven technology coaches worked in reciprocal partnerships with teachers to integrate technology to the curriculum (Hutchison & Reinking, 2010; Knight, 2007, 2009; Kopcha, 2012). The social cognitive theory was used as a lens to explore how, if at all, middle school teachers' beliefs concerning the importance of curriculum-driven technology and teachers' beliefs about their ability to integrate curriculum-driven technology were influenced by working in reciprocal partnership with a curriculum-driven technology coach. The research questions in this study were developed to explore the middle school teachers' self-efficacy regarding curriculum-driven technology and pedagogy.

Significance of the Study

Curriculum-driven technology became an integral and mandated part of education as the job demands of U.S. K-12 public school principals increased (McCandles, 2015; Ross et al., 2010; Schaffhauser, 2018). Curriculum-driven technology was a way to even the academic playing field among students with economic advantages, students of lower socioeconomic levels, and students with disabilities by providing a means of individualized, student-focused instruction (Franklin & Bolick, 2007; Ross et al., 2010; Tamim et al., 2011). The most important benefit of curriculum-driven technology was the equitable access to academic curriculum provided to all students no matter socioeconomic or ability level (Franklin & Bolick, 2007; Kopcha, 2012; Mesecar, 2015; Reynolds et al., 2016). Principals, in addition to their other duties, were expected to be the instructional leaders in their building, which included being leaders in the integration of instructional technology (Alvoid & Black, 2014; Chaudhuri, 2016; Cravens et al., 2017; Davis et al., 2005; Dawson & Rakes, 2003; Gray et al., 2007; ESSA, 2015; NCLB, 2002; U.S. Department of Education, 2001a, 2001b, 2005).

Schools principals and school district leaders hired instructional coaches in varied academic areas in response to the time restraints affecting principals (Chaudhuri, 2016; Davis et al., 2005; Dawson & Rakes, 2003; ISTE, 2018; Kowal & Steiner, 2007; Lashway, 2003; Maxwell, 2015; Mead, 2011; Sheng et al., 2017; Sweeney & Mausbach, 2019; Van Roekel, 2008). Curriculum-driven technology coaching positions were created following the initial use of instructional coaches for English and math instruction (Davis et al., 2005; ISTE, 2017; Knight, 2007, 2009; Maxwell, 2015). The use of curriculum-driven technology coaches was a way for principals to provide instructional leadership by coordinating the academic technology goals of the school with the needs of the teacher (Chaudhuri, 2016; Davis et al., 2005; Dawson & Rakes, 2003; ISTE, 2017; Kowal & Steiner, 2007; Lashway, 2003; Maxwell, 2015; Mead, 2011; Sheng et al., 2017; Sweeney & Mausbach, 2019; Van Roekel, 2008).

Research on the use of instructional coaches, in any field, was hindered by a lack of standardization in the job responsibilities and training of these coaches (Anderson et al., 2014; Boeshie, 2019; Johnson, 2016; Knight, 2007). There was not one recognized standard of training, nor was there one agreed upon set of qualifications, for instructional coaches in the United States (Anderson et al., 2014; Boeshie, 2019; Cravens et al., 2017; Johnson, 2016; Knight, 2007). Leaders in each school district, and in some cases each school, hired, trained, and evaluated instructional coaches on an individual school or district basis (Anderson et al., 2014; Boeshie, 2019; Knight, 2007). There was little research specifically on curriculum-driven technology coaching and its influence upon teacher practice (Anderson et al., 2014; Knight, 2007). Even though the research on curriculum-driven technology coaches was limited, an analysis of the available research on the effectiveness of instructional coaches in general indicated a strong correlation between instructional coaching and improved teacher practice (Anderson et al., 2014; Johnson, 2016; Knight, 2007, 2009).

I designed this study to explore one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach. Middle school teachers from the Buford School District (BSD) (pseudonym), a school in the southeast United States, were chosen because BSD leaders provided all middle school students with a Chromebook, a year before any other grade band, and they provided teachers access to curriculum-driven technology coaches within their school buildings. I collected middle school teachers' feedback through their responses to the research study questionnaire regarding how curriculum-driven technology coaching influenced perceived curriculum-driven technology self-efficacy and teachers' beliefs of the importance of using curriculum-driven technology. In addition, the interpreted results of this study may be used to provide information to education stakeholders (e.g., school district leaders, principals, instructional coaches, teachers) on teachers' perceived curriculum-driven technology efficacy after working with an instructional technology coach.

Description of the Terms

I proposed this study to explore teachers' perceptions of the importance of curriculum-driven technology and their self-efficacy regarding the use of curriculum-driven technology after working with a curriculum-driven technology coach. Terminology specific to my purpose for this study has been clarified.

Curriculum-Driven Technology

Curriculum-driven technology was the teacher's coordinated and embedded use of technology to present curriculum that could be tailored to individual student needs and could be interactive, such as digital textbooks, assessment programs, and educational websites (Anglin, 2011; Cauthen, 2021; Ferster, 2014; Franklin & Bolick, 2007; Institute of Education Science, 2008; Magana, 2017; Reynolds et al., 2016; Ross et al., 2010; Saba, 2009; Sandholtz et al., 1994; Smith, 2006; Sulla, 2011). Curriculum-driven technologies not only provided curricular instruction support to students but also presented instruction materials through an interactive format (e.g., hardware such as computers and instructional digital platforms such as Discovery Education) (Magana, 2017; Sulla, 2011). Curriculum-driven technology could also be accessed within the classroom or from home to meet class instructional objectives or individual student learning needs (Anglin, 2011; Bauer & Kenton, 2005; Collins & Halverson, 2018, Magana, 2017; Smith, 2006; Sulla, 2011; Tamim et al., 2011).

Curriculum-Driven Technology Coaches

Curriculum-driven technology coaches were teachers, either out of the classroom or teaching part time, who mentored, instructed, and assisted other teachers with integrating curriculum-driven technology to their curriculum

(Anglin, 2011; Carbonara, 2009; Dunham, 2012; Gallucci et al., 2010; Knight, 2009, 2011; Kowal & Steiner, 2007; Lia, 2017; Smith, 2006; Sulla, 2011; Walkowiak, 2016). Curriculum-driven technology coaches were instructional coaches who specialized in working with teachers to utilize curriculum-driven technology across all curriculums (Anglin, 2011; Bauer & Kenton, 2005; Carbonara, 2009; Collins & Halverson, 2018; Ertmer & Ottenbreit-Leftwhich, 2010; Gallucci et al., 2010; Halter & Finch, 2011; Knight, 2009, 2011; Quintero, 2019; Smith 2006).

Instructional Coaches

Instructional coaches were teachers, either out of the classroom or teaching part time, who mentored and assisted other teachers to improve instructional practices in a non-evaluative manner as part of an ongoing professional development (Anderson et al., 2014; Gallucci et al., 2010; Knight, 2009, 2011; Kowal & Steiner, 2007; Lia, 2017; Walkowiak, 2016). Instructional coaches worked with teachers individually or in small groups and provided guidance on instruction, assessment, and student behavior modification strategies (Anderson et al., 2014; Knight, 2009, 2011; Kowal & Steiner, 2007).

Technology

Technology was the utilization of human knowledge, skills, and experiences to transform environments through the use of tools, services, and machines (Buchanon, n.d.). Technology was not the curriculum itself but the means by which students gained access to the curriculum (Anglin, 2011; Collins & Halverson, 2018, Magana, 2017; Smith, 2006; Sulla, 2011). For the purpose of this study, technology was computer hardware, computer software, online textbooks, academic websites, or other digital tools, such as smartboards, virtual reality equipment, and smart phones (Carver, 2021; Cauthen, 2020; Ferster, 2014; Halter & Finch, 2011).

Technology Teacher Leader

BSD leaders developed and implemented a program of curriculum-driven technology professional development called the Technology Teacher Leader (TTL) program and called their curriculum-driven technology coaches TTLs. Two teachers from each BSD school were chosen through a system-wide application process to provide curriculum-driven technology professional development to teachers while remaining classroom teachers. The TTLs presented professional development to groups or individual teachers and were available during planning periods and before or after school. Teachers were not required to work with TTLs.

Organization of the Study

In Chapter I of this document, I introduced the federal mandates for curriculum-driven technology, the expectations of instructional leadership placed on principals, and impetus of curriculum-driven coaches. I provided background information to explore one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach. Chapter I included an introduction, the statement of the problem, research questions on teacher perceived curriculum-driven technology self-efficacy as a result of participating in a curriculum-driven coaching relationship, the theoretical framework of social cognitive theory, the significance of the study, and a description of the important terms.

In Chapter II, I included a thorough review of the literature including the history of technology in education, the need for reform in education, Apple Classroom of Tomorrow (ACOT) research studies, federal technology laws and initiatives, curriculum-driven technology integration benefits to students, barriers to curriculum-driven technology integration, administrator curriculum-driven technology integration leadership, instructional coaching, and curriculum-driven technology coaching. In Chapter III, I discussed this qualitative study in one southeastern school district where I described how I collected and analyzed questionnaire responses from teachers in the districts' middle schools (grades 6-8). After completing the study, in Chapter IV, I reported results for the data based on Creswell's (2014) six steps for data analysis. Finally, in Chapter V, I summarized the findings and considered the implications for future research on teacher perceptions of the relationship between curriculum-driven technology coaches and teachers' self-efficacy regarding integrating curriculum-driven technology and the importance of curriculum-driven technology. In the following chapter, I have presented my literature review, which provided a foundation for my research on teacher perceptions of self-efficacy in the use of curriculum-driven technology and their perceptions of the importance of implementing curriculum-driven technology after working with a curriculum-driven technology coach.

Chapter II: Review of the Literature

The use of curriculum-driven technology in K-12 classrooms was mandated by local, state, and federal agencies necessitating teacher professional development on integrating curriculum-driven technology to the curriculum (Enhancing Education through Technology Act of 2001 [EETT], 2001; ESSA, 2015; Mesecar, 2015; NCLB, 2002; U.S. Department of Education, 2001a). In some schools, curriculum-driven technology coaches were the professionals tasked to work with teachers to provide curriculum-driven technology training (Anglin, 2011; Ertmer & Ottenbreit-Leftwich, 2010; Hutchison & Reinking, 2010; Sandholtz & Reilly, 2004; Sulla, 2011).

This literature review was designed to include a thorough review of the research conducted concerning the history of technology in education, the need for reform in education, ACOT research studies, federal technology laws and initiatives, instructional technology integration benefits to students, barriers to instructional technology integration, administrator instructional technology integration leadership, and instructional coaching. The use of technology as a way to provide instruction has been a part of education since the introduction of the first educational films in the early 1900s (Olszynko-Gryn, 2016). After the development of these black and white, soundless films, scientific advancements in the capabilities of educational machines and other computing technology tools occurred, which led to increased educational use of technology as an instructional tool (Carbonara, 2009; Franklin & Bolick, 2007; Harris et al., 2009; McCandles, 2015). As technological capabilities increased throughout the 20th century (Ferster, 2014), legislators created federal guidelines, regulations, and mandates specifically to foster educational reform (EETT, 2001; ESSA, 2015; Mesecar, 2015; NCLB, 2002; U.S. Department of Education, 2001a). Laws such as EETT, NCLB, and ESSA outlined requirements for educational technology use, administrator instructional leadership, and educator professional development for all public K-12 schools that received federal funding (Hew & Brush, 2007; Institute of Education Science, 2008; ISTE, 2015, 2016, 2018; Margolis et al., 2017; Mesecar, 2015; U.S. Department of Education, 2000b, 2001a, 2005, 2016).

The first instructional coaching positions were established in the 1980s in response to The National Commission on Education's 1983 report, *A Nation at Risk: The Imperative for Educational Reform* (Gardner, 1983). The Commission outlined the poor state of education in America and advocated for reform (Gardner, 1983; National Commission on Excellence in Education, 1983). As more federal legislation passed, the number of instructional coaching positions increased as a way to assist school district leaders and administrators to meet the requirements for administrator instructional leadership and educator professional development required by the aforementioned federal mandates (Anderson et al., 2014; Gallucci et al., 2010; Johnson, 2016; Knight, 2009, 2011; Lia, 2017). The purpose of this research was to explore one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach.

For this study, I reviewed literature that included topics such as the history of technology integration to the curriculum, federal educational mandates and guidelines, the duties of school administrators, and the role of instructional coaching in providing teacher professional development concerning the use of curriculum-driven technology. Curriculum-driven technology was the teacher's coordinated and embedded use of technology to introduce curriculum that could be tailored to individual student needs and could be presented through an interactive format (e.g., hardware such as computers and instructional digital platforms such as Discovery Education) (Anglin, 2011; Ferster, 2014; Franklin & Bolick, 2007; Hew & Brush, 2007; Institute of Education Science, 2008; Magana, 2017; Reynolds et al., 2016; Ross et al., 2010; Saba, 2009; Sandholtz et al., 1994; Smith, 2006; Sulla, 2011). Except for documents related to the history of education reform movements, the history of instructional technology, the historical use of technology in education, and the history of instructional coaching in K-12 education—all used to provide background—I determined other extant research included in this literature review had to meet the criteria of being developed during or after the implementation of NCLB.

NCLB (2002) marked the first time national technology standards and expectations for K–12 public schools were not just recommended but *required* by the federal government. States needed to be in compliance with NCLB to be eligible for federal education funding (NCLB, 2002; Part-D-EEET, 2005; U.S. Department of Education, 2001a). NCLB established standards for the use of technology in education that included expectations for equal access to technology and the use of instructional technology for all students, educators, and school systems in U.S. public K-12 schools (Franklin & Bolick, 2007; Hew & Brush, 2007; NCLB, 2002; U.S. Department of Education, 2005).

History of Technology in Education

Technology was any tool, procedure, or machine developed by humans to assist humans (Anglin, 2011; Ferster, 2014; Technology, n.d.). Under that definition, tools such as pencils, pens, paper, chalk, and chalkboards were considered technology. For this study, I focused on curriculum-driven technology coaches who worked with teachers on technologies that not only provided curricular instruction support to students but could also present instruction materials through an interactive format (e.g., hardware ,such as computers and instructional digital platforms, such as Discovery Education) (Magana, 2017; Sulla, 2011).

Early Instructional Technology

In the early 1900s, Urban, an early specialist in time lapse filmmaking techniques, produced a short silent film titled *The Cheese Mites,* one of the first films specifically made for educational purposes (Olszynko-Gryn, 2016). *The Cheese Mites* depicted the decomposition of a wedge of Swiss cheese by bacteria over a 30-day time period (Olszynko-Gryn, 2016; Urban, 1903). *The Cheese Mites* marked the first time the process of food decay had been captured on film (Olszynko-Gryn, 2016; Urban, 1903). Urban's film was popular with educators and the public, so he developed more films that depicted the biological decay of several other food items (Olszynko-Gryn, 2016), which collectively became known as the *Unseen World* series (Olszynko-Gryn, 2016). Scientific advancements and expanded technological capabilities in film recording, photography, and audio recording increased the opportunities for technology use in the educational setting (Anglin, 2011; Ferster, 2014). Before 1925, the educational use of technology, such as films and audio recordings, was strictly a passive activity for students (Benjamin, 1988; Fry et al., 1960; Ross et al., 2010; Skinner, 1961, 2003); students were expected to absorb information as they listened to audio or watched films, but they were not expected to, nor were they able to, interact with those forms of instructional technology (Ferster, 2014; Fry et al., 1960; Ross et al., 2010).

In 1925, Sidney L. Pressey, a professor of psychology at The Ohio State University, invented the mechanical teaching machine, which marked the first time a piece of technological equipment was specifically developed as an instructional tool for individual student use (Anglin, 2011; Benjamin, 1988; Ferster, 2014; Fry et al., 1960; Ross et al., 2010; Skinner, 1961). A predecessor to modern computer curriculum review programs for students, Pressey's mechanical teaching machine allowed users to respond to curriculum-based, multiple choice questions (Anglin, 2011; Benjamin, 1988; Fry et al., 1960; Ross et al., 2010; Skinner, 1961). If a student's response was correct, the student moved to the next question and then the next, until the teacher-designed question bank was exhausted (Anglin, 2011; Benjamin, 1988; Ferster, 2014; Fry et al., 1960; Skinner, 1961). The student's goal when using the mechanical teaching machine was to demonstrate mastery of instructional content by correctly answering all curriculum-based multiple choice questions (Anglin, 2011; Benjamin, 1988; Ferster, 2014; Fry et al., 1960; Skinner, 1961). Anglin (2011) stated the student's reward for correctly answering the questions was to progress to the next level of curriculum content, as determined by the teacher or school.

Conversely, a student’s incorrect response was marked by the machine, and the student was given another chance to answer the question correctly based on the remaining answer choices (Benjamin, 1988; Ferster, 2014, Fry et al., 1960; Ross et al., 2010; Skinner, 1961). If a student responded incorrectly, depending on a teacher-determined number of times, the ability to progress through the curriculum-based multiple choice questions was stopped by the machine (Anglin, 2011; Benjamin, 1988; Ferster, 2014; Fry et al., 1960; Ross et al., 2010; Skinner, 1961). After the student consistently answered questions incorrectly and progress through the multiple choice questions was stopped, the student was expected to study the curriculum materials further and then return to the teaching machine and, once again, attempt to correctly answer the multiple choice questions (Benjamin, 1988; Ferster, 2014; Ross et al., 2010). Skinner (1961, 2003) stated Pressey’s teaching machine was not widely used because scientists in the 1920s and 1930s were not interested in how or why students learned, only how *quickly* they learned. The invention of the mechanical teaching machine marked the first time the user of curriculum-driven instructional technology actively interacted with the technology rather than was a passive observer of the technology (Anglin, 2011; Benjamin, 1988, Ferster, 2014; Fry et al., 1960; Ross et al., 2010; Skinner, 1961, 2003).

B. F. Skinner, a behavioral psychologist in the mid-to-late 20th century, considered teaching machines to be the future of education because immediate feedback was provided to students as they progressed through the machine’s academic program (Benjamin, 1988; Ferster, 2014; Fry et al., 1960; Skinner, 1961). Skinner believed immediate feedback was essential to student learning and fostered the behaviors of self-motivation and perseverance (Ross et al., 2010; Skinner, 1961, 2003). Skinner (1961) stated the use of teaching machines helped students because the machines provided students the opportunity to learn and progress through the curriculum at their own pace. Skinner invented his own teaching machine, which was designed to present a program of study, developed by educators, that met each student's individualized needs (Benjamin, 1988; Ferster, 2014; Fry et al., 1960; Ross et al., 2010; Skinner, 1961, 2003). Skinner (1961) stated his machine kept students engaged and active participants in their own learning. The machine used programs developed by individual educators specific to their curriculums (Benjamin, 1988; Ferster, 2014; Fry et al., 1960; Ross et al., 2010; Skinner, 1961, 2003). The potential for individualized student instruction demonstrated by the programs used in Skinner's teaching machine became the foundation for the type of educational computer programs used in classrooms in the 1980s and 1990s (Anglin, 2011; Ferster, 2014; Ross et al., 2010).

The Need for Education Reform

In the early 1980s, U.S. President Ronald Reagan created the 18 member National Commission on Excellence in Education and tasked them with determining the state of American education (Culp et al., 2005; Gardner, 1983; Margolis et al., 2017). The National Commission on Excellence in Education released their report, *A Nation at Risk: The Imperative for Educational Reform*, after an 18-month study of the American education system (Culp et al., 2005; Gardner, 1983; National Commission on Excellence in Education, 1983). The Commission wrote the state of education in the United States was so flawed that "if an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war" (Gardner, 1983, p. 3). The Commission stated part of the reason the education system had fallen to such a subpar level was students did not have the technology skills to compete in the future domestic and global economy or future job markets (Culp et al., 2003, 2005; Gardner, 1983; Margolis et al., 2017; National Commission on Excellence in Education, 1983).

The Commission's report was the origin of local, state, and federal education reform movements, including standardized assessments, federal technology policies, federal technology laws, and research studies because the Commission recommended teaching about, and use of, computers in the classroom to improve education (Culp et al., 2003, 2005; Gardner, 1983; Margolis et al., 2017; U.S. Department of Education, 2001a). The Commission's report stated technology would become increasingly important to every aspect of human life and would drastically transform many existing occupations as well as create new industry (Culp et al., 2003, 2005; Gardner, 1983; Margolis et al., 2017; U.S. Department of Education, 2001a). The federal and public focus on educational reform generated by the Commission's report led to the implementation of two seminal studies conducted by Apple Computers, Inc. on the use of on the use of instructional technology (Apple, Inc., 2000; Franklin & Bolick, 2007; Muir-Herzig, 2004; Murphy & Gunter, 1997; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994).

Apple Classrooms of Tomorrow

Growing technological capabilities expanded the role of technology in the classroom (Ferster, 2014; Muir-Herzig, 2004; Ross et al., 2010). In 1984, Apple Computers, Inc. introduced the Macintosh, a personal computer, at a price point affordable to middle class Americans and schools (Apple, Inc., 2000; History-Computer, 2019; Ringstaff et al., 1996; Sandholtz et al., 1994). In 1985, Apple Computers, Inc. embarked on a decade-long qualitative research project in collaboration with seven U.S. K-12 public school classrooms and three universities (Apple, Inc., 2000; Franklin & Bolick, 2007; Muir-Herzig, 2004; Murphy & Gunter, 1997; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994). The project was named ACOT, and former educators were hired to design the study and participate in conducting research (Apple, Inc., 2000; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994).

The schools that initially participated in the ACOT study were located in six different states and included suburban elementary schools, an inner-city elementary school, a rural middle school, an inner-city middle school, and an urban high school (Anglin, 2011; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994). ACOT researchers asked interested teachers, schools, and school district leaders to apply for inclusion in the study, and then researchers picked their research participants based on the pool of volunteers and the demographics of the classroom (Anglin, 2011; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994). ACOT researchers used student sex, student race, student economic levels, class size, and school location to determine the classrooms chosen to participate in the study represented a balanced and wide cross-section of student populations (Anglin, 2011; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994)

ACOT researchers selected one classroom from each of the schools as research participants (Anglin, 2011; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994). In 1986, 1987, and 1988, more classrooms were added for a total of 32 participating classrooms by the conclusion of the 10-year study (Anglin, 2011; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994). The ACOT researchers included one classroom of students from each of the following locations: Eugene, Oregon; Blue Earth, Minnesota; Columbus, Ohio; Cupertino, California; Houston, Texas; Memphis, Tennessee; and Nashville, Tennessee (Apple, Inc., 2000; Tamim et al., 2011). Researchers from the University of California at Los Angles, The Ohio State University, and the University of Colorado partnered with ACOT researchers for the study (Apple, Inc., 2000; Ross et al., 2010, Sandholtz et al., 1994; Tamim et al., 2011). The ACOT researchers provided basic computer training for the participating classroom teachers, presented an overview of the purpose for conducting the study goals to the school communities, and presented information and updates to the school districts involved in the study (Apple, Inc. 2000; Ross et al., 2010; Tamim et al., 2011). ACOT researchers designed the study to be open ended and exploratory; they wanted to see what would happen to the students' academic performance if students and teachers had unhindered access to computers at school and at home (Apple, Inc., 2000; Franklin & Bolick, 2007; Ross et al., 2010; Sandholtz et al., 1994; Tamim et al., 2011). A computer was provided for each participating teacher and student, both at school and at home (Apple, Inc., 2000; Franklin & Bolick, 2007; Ross et al., 2010; Sandholtz et al., 1994; Tamim et al., 2011).

Franklin and Bolick (2007) stated the purpose of the ACOT study "was to transform traditional knowledge instruction classrooms into *knowledge construction* classrooms" (p. 11). The overarching goal of the ACOT project was to create educational environments where creative thinking and problem solving would be fostered and facilitated (Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010). The ACOT researchers wanted to study teachers' professional development in the use of instructional technology and student academic outcomes, positive and negative, with the utilization of technology as an educational tool in the classroom (Franklin & Bolick, 2007; Muir-Herzig, 2004; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994, 1997). Apple Computers, Inc.'s intent with the ACOT research project was not to replace all existing instructional material with computers but to have computers available for student use when deemed instructionally appropriate by the teacher (Franklin & Bolick, 2007; Muir-Herzig, 2004; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994, 1997; Tamim et al., 2011).

In 1987, Apple Computers, Inc. hosted a summer conference for ACOT researchers, participating teachers, and collaborating university professors to share their ideas, experiences, and instructional technology strategies used by teachers (Apple, Inc., 2000; Ross et al., 2010, Sandholtz et al., 1994; Tamim et al., 2011). The conference allowed teachers, researchers, and Apple Computers, Inc. to share information and ask questions (Apple, Inc., 2000; Ross et al., 2010; Tamim et al., 2011). Researchers at the conference stated their desire was to condense the research studies being conducted in multiple settings to a smaller number of research sites to better control the variables affecting their research results (Apple, Inc., 2000; Ross et al., 2000; Tamim et al., 2011). By 1989, the ACOT researchers shut down all other sites to focus on classrooms in Columbus, Ohio; Cupertino, California; and Nashville, Tennessee (Apple, Inc. 2000; Ross et al., 2010; Sandholtz et al., 1997; Tamim et al., 2011). The California and Ohio sites remained in the study due to the proximity of the ACOT researchers who worked with the University of California and The Ohio State University (Apple, Inc. 2000; Ross et al., 2010; Sandholtz et al., 1997; Tamim et al., 2011). The Nashville site remained in the ACOT study due to the support and resources provided by Tennessee Department of Education. ACOT researchers chose to reduce the number of research sites to increase the number of classes and grade levels included in the study at the retained sites; the goal was to collect data across grade levels by tracking students' instructional technology use from one grade to another, whenever possible (Apple, Inc. 2000; Ross et al., 2010; Sandholtz et al., 1997; Tamim et al., 2011).

Through the results of the ACOT study, researchers identified educational benefits of fully curriculum-driven technology and barriers that prohibited teachers from effectively implementing curriculum-driven technology in their classrooms (Apple, Inc., 2000; Franklin & Bolick, 2007; Muir-Herzig, 2004;

Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994, 1997; Tamim et al., 2011). Benefits included better student engagement, equitable access to information, and the ability to develop individualized lessons for students (Apple, Inc., 2000; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010; Sandholtz et al., 1994, 1997). ACOT researchers further stated a benefit to the equitable access of computers was allowing teachers to create more personalized and challenging learning environments for students of all academic abilities without regard to the socio-economic levels of the students (Apple, Inc. 2000; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010; Sandholtz et al., 1997; Tamim et al., 2011). ACOT researchers stated students developed collaborative skills and self-efficacy toward their academic abilities due to the use of computers in furthering their own academic knowledge (Apple, Inc., 2000; Ross et al., 2010; Tamim et al., 2011).

Barriers to curriculum-driven technology, identified by ACOT researchers, included the need for ongoing teacher professional development and the financial burden of technology upgrades for schools and districts (Apple, Inc., 2000; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010; Sandholtz et al., 1994, 1997, Tamim et al., 2011). In some cases, these barriers prevented students from realizing the potential for academic improvements that technology offered (Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010). ACOT researchers expressed their desire to launch another Apple Computers, Inc. study with the goal of identifying how technology could be effectively used as a tool for learning and how best to prepare teachers to integrate curriculum-driven technology to the curriculum (Apple, Inc., 2000; Ross et al., 2010; Sandholtz et al., 1994).

Apple Computers, Inc. conducted a second ACOT study, termed ACOT II or ACOT^2, that began one year after the first ACOT study ended in 1995 (Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010, Tamim et al., 2011). The ACOT II researchers approached their study in an identical manner to the first ACOT study in that the researchers developed an open-ended exploratory study, provided technology training to teachers, provided information and updates to the community and school district leaders, and gave a school and home computer to each teacher and student participating in the study (Apple, Inc., 2008; Bauer & Kenton, 2005; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010). In contrast to the first ACOT study, ACOT II researchers focused on identifying elements U.S. high schools needed to be considered a 21st century school (Bauer & Kenton, 2005; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010), which ACOT II researchers identified as schools that provided students with the skills needed to be successful academically, socially, and professionally in the 21st century (Apple, Inc., 2008: Culp et al., 2005; Ross et al., 2010). According to ACOT II researchers, 21st century schools created a culture of innovation, fostered an emotional connection with their students, and provided unhindered access to technology for the purpose of individualized, student-focused learning (Apple, Inc., 2008; Culp et al., 2005; Tamim et al., 2011).

The ACOT II study, which began in 1996 and ended in 2006, resulted in almost identical identified benefits and barriers to implementing curriculum-driven technology in the academic curriculum (Bauer & Kenton, 2005; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010). The ACOT II researchers determined three main benefits of curriculum-driven technology: opportunity for students to experience individualized instruction, student-focused academic interest and discovery, and student self-efficacy in academic achievement (Apple, Inc., 2008; Ross et al., 2010; Tamim et al., 2011). ACOT II researchers identified ongoing teacher professional development and the cost of technology and technology upgrades as barriers to integrating instructional technology to the curriculum (Apple, Inc., 2008; Ross et al., 2010, Tamim et al., 2011).

ACOT researchers in the first study focused on exploring the effects of unhindered access to technology on student academic growth; while ACOT II researchers also studied the effects of unhindered access to technology on student academic growth, the ACOT II researchers' shifted their main focus to the effective use of curriculum-driven technology (Apple, Inc., 2000, 2008; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010; Sandholtz et al., 1994, 1997; Tamim et al., 2011). Researchers in the first ACOT study provided computers to students and teachers and taught the participants how to operate them, but the researchers in the ACOT II study wanted to move past just having a computer available; these researchers wanted to study how to effectively use instructional technology to positively impact student learning (Apple, Inc., 2000, 2008; Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010; Sandholtz et al., 1994, 1997; Tamim et al., 2011). The researchers concluded both ACOT and ACOT II highlighted the need for educators and school district leaders to integrate curriculum-driven technology to the academic curriculum and provide curriculum-driven technology focused professional development opportunities for teachers (Apple, Inc., 2000, 2008; Ringstaff et al., 1996; Sandholtz et al., 1994, 1997; Tamim et al., 2011). The U.S. Department of Education cited the results from both ACOT studies as evidence of the important role technology could play in the academic success of students (Apple, Inc., 2008; Ross et al., 2010; Sandholtz et al., 1994, 1997; Tamim et al., 2011).

Apple Computers, Inc., university partners, and the participating school and district educators published papers, spoke at conferences, participated in television interviews, appeared before the U.S. Congress, and discussed the results of both ACOT studies, highlighting the positive effect integrated technology had on student engagement and academic achievement (Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010; Sandholtz et al., 1994, 1997; Tamim et al., 2011). The methodology, longevity, and results of the ACOT studies sparked federal initiatives that encouraged, and later mandated, instructional technology in the classroom (Bauer & Kenton, 2005; Franklin & Bolick, 2007; Ross et al., 2010), such as the establishment of the federal Office of Educational Technology, the development of a national technology plan, and the availability of federal technology grant projects to schools (U. S. Department of Education, 2000a, 2000b, 2001a, 2005, 2016).

Federal Technology Laws and Initiatives

Education reformers became interested in instructional technology after the publicity generated by the ACOT studies (Culp et al., 2005; Ross et al., 2010). In 1994, U.S. President William Clinton's administration developed, and

Congress passed, the Goals 2000 Educate America Act (Goals 2000) (1994), which established the Office of Educational Technology as a branch of the Department of Education to lead the nation in the educational use of technology, promote the use of educational technology, and support education reform in America (Goals 2000, 1994; Superfine, 2005). Of the 378 million dollars allocated by the federal government to fund Goals 2000, only 10% was used by states to acquire educational technology (Superfine, 2005). Superfine (2005) surmised the lack of technology spending by school district leaders was because Goals 2000 had no state or school district accountability embedded within the initiative.

The integration of curriculum-driven technology to school classrooms and the academic curriculum became a mandatory and expensive endeavor for schools, school districts, and states as more federal instructional technology initiatives and mandates were enacted (McCandles, 2015; Schaffhauser, 2018; U.S. Department of Education, 2001a, 2001b; Wan, 2019). The U.S. Congress passed the NCLB in 2001, which amended the Elementary and Secondary Education Act (ESEA) of 1965 (NCLB, 2002; U.S. Department of Education 2001a, 2001b, 2009). NCLB (2002) outlined national technology standards and expectations for K–12 public schools that were *required* by the federal government for a state to be considered in compliance with the law and eligible for federal education funding (U.S. Department of Education 2001a, 2001b). NCLB (2002) required schools and school district leaders to create and maintain the infrastructure needed for instructional technology and internet access;

however, NCLB (2002) did not provide federal funding to schools and school districts to implement the technology requirements.

In 2015, the ESSA became law, replacing NCLB and amending ESEA (ESSA, 2015). Whereas NCLB contained federal standards focused on technology equipment and use, ESSA extended those standards to include requirements for instructional technology-focused professional development for teachers and school administrators (ESSA, 2015; ISTE, 2016; NCLB, 2002; Reynolds et al., 2016). ESSA also required states to invest in technology infrastructure, including devices, software, and internet access (ESSA, 2015; ISTE 2016, 2018; Reynolds et al., 2016; U.S. Department of Education, 2016). ESSA mandated schools and school district leaders implement curriculum-driven technology-based professional development, develop district technology leaders, improve technology use for academic achievement, and use technology-based assessment tools (ESSA, 2015; ISTE, 2016; Reynolds et al., 2016).

The Office of Educational Technology stated teacher preparation programs should incorporate instructional technology strategies in all coursework, asked states to prioritize equitable access to instructional technology for all students, encouraged K-12 schools to begin replacing printed textbooks with open-sourced digital resources, and recommended school district leaders provide technology-based assessments (U.S. Department of Education, 2016). To offset the costs of implementing the federal mandates under the ESSA, Congress made the 1.65 billion dollar Student Support and Academic Enrichment Grant available to states and school districts, and funded the grant annually for three purposes: providing a well-rounded education to students, developing programs that supported safe and healthy students, and using technology effectively in the curriculum and for assessments (ISTE, 2016; Mesecar, 2015; U.S. Department of Education, 2016).

Global educational technology spending exceeded 12 billion dollars in 2015 (Schaffhauser, 2018; Wan, 2019), with U.S. K–12 school district leaders spending approximately 9.5 billion dollars on curriculum-driven educational technology in 2015 (McCandles, 2015; Schaffhauser, 2018; Wan, 2019). In 2018, global educational technology spending surpassed 19 billion dollars, which represented an 100% increase in money spent on educational technology, from 2015 to 2018 (McCandles, 2015; Schaffhauser, 2018; Wan, 2019). In 2019, U.S. K-12 school leaders spent 28.3 billion dollars on technology, and in 2020, that total increased to 35.8 billion dollars (Cauthen, 2021). U.S. politicians, educators, and the general public have questioned whether the materials, money, and time spent integrating technology in U.S. K–12 public school classrooms improved the academic achievement of students (Culp et al., 2005; Inan & Lowther, 2010a, 2010b; Inan et al., 2010; Ross et al., 2010; Tamim et al., 2011).

Instructional Technology Integration Benefits to Students

For education stakeholders, technology had long been considered a cure-all for the ills perceived to be present in education (Franklin & Bolick, 2007; Muir-Herzig, 2004; Ross et al., 2010; Tamim et al., 2011). Technology in education was a positive change agent for student academic achievement (Ertmer, 2005; Franklin & Bolick, 2007; Kopcha, 2012; Ross et al., 2010; Tamim et al., 2011). The potential for the use of curriculum-driven technology to improve student academic achievement became increasingly important to schools, school districts, and states (Ferster, 2014; Muir-Herzig, 2004; Ross et al., 2010; Tamim et al., 2011). Technology, as a tool in education, was as a way to even the academic playing field for lower socioeconomic students and students with disabilities by providing a means of individualized student-focused instruction (Franklin & Bolick, 2007; Ross et al., 2010; Tamim et al., 2011).

In a study conducted in an Oklahoma public high school, grade 10 students who learned geometry through teacher-led classroom instruction in addition to a computer tutoring program out-scored students, by an average of 17%, who were taught by teacher-led classroom instruction but did not have access to the computer tutoring program (Funkhouser, 2003; Saba, 2009). In another study, researchers investigated the effect a one-to-one laptop program had on middle school students' standardized test scores (Gulek & Demirtas, 2005). Of the 1,085 students enrolled in a middle school located in Pleasanton, California, 259 students (i.e., 91 grade 6, 93 grade 7, and 75 grade 8) participated in the voluntary one-to-one laptop program. The students who participated in the one-to-one laptop program were each given a laptop preloaded with multiple tutoring programs that correlated with the school's math and English curriculums for use at school and home (Gulek & Demirtas, 2005). Gulek and Demirtas (2005) stated the middle school students enrolled in the one-to-one laptop program scored proficient or advanced on state tests 17% more often than students who did not participate in the laptop program.

Ross et al. (2010) stated, "Educational technology is not a homogeneous *intervention* but a broad variety of modalities, tools, and strategies for learning. Its effectiveness, therefore, depends on how well it helps teachers and students achieve the desired instructional goals” (p. 3). Researchers in both ACOT studies identified benefits of integrated technology in the classroom, including better student engagement, equitable access to information, and the ability to develop individualized lessons for students (Anglin, 2011; Bauer & Kenton, 2005; Franklin & Bolick, 2007; Ross et al., 2010). Franklin and Bolick (2007) stated equitable access to information was the most important benefit of integrated technology in the curriculum because access to curriculum-driven technology provided students from all socioeconomic backgrounds and abilities the same access to educational information.

Students with disabilities, rural students, and students from low socio-economic levels especially benefitted from the use of curriculum-driven technology because these students did not have the same access to educational opportunities as their peers from urban or suburban areas, from more affluent families, or without disabilities (Anglin, 2011; Ross et al., 2010; Sulla, 2011). Students with disabilities benefitted from the personalized learning opportunities curriculum-driven technology provided them by allowing these students to progress at their own pace (Anglin, 2011; Collins & Halverson, 2018; Franklin & Bolick, 2007; Hew & Brush, 2007; Institute of Education Science, 2008; Magana, 2017; Pritchett et al., 2013; Saba, 2009). Students with physical and learning disabilities may have underperformed on tests because of the format through which the test was administered (Anglin, 2011; Collins & Halverson, 2018; Magana, 2017; Saba, 2009). Researchers conducted a study in a New York City public high school and stated dyslexic students improved their performance on multiple choice U.S. History and Civics standardized tests when they used an integrated read-aloud assessment computer program instead of silently reading questions on their own (Saba, 2009). The read aloud support resulted in an average increase of student scores of 11% (Saba, 2009).

Harris et al. (2016) performed a study to determine if curriculum-driven technology positively impacted student achievement in a high poverty school. The researchers studied test scores of two different classes of grade 4 students at a northeast elementary school with a 68% free and reduced lunch eligible student population (Harris et al., 2016). One class of students did not have regular access to curriculum-driven technology, while the other grade 4 class, through a grant, provided daily access to curriculum-driven technology for each student (Harris et al., 2016). Harris et al. (2016) compared the two classes' tests scores from Discovery Education—a digital assessment company contracted by the school to provide assessment data on student achievement in preparation for state assessments—mathematics assessments, which the participating school administered to students four times per year. Students with regular access to curriculum-driven technology averaged scores 20% better on three of the four mathematics tests administered compared to students without regular access to instructional technology (Harris et al., 2016). The one test on which students all scored the same, with or without curriculum-driven technology access, was the first test administered (Harris et al., 2016).

Collins and Halverson (2018) stated curriculum-driven technology provided *just in time learning,* defined by the researchers as the ability to learn information whenever it was necessary to learn something. Curriculum-driven technology expanded content knowledge by removing the need to depend solely on printed textbooks (Collins & Halverson, 2018; Franklin & Bolick, 2007; Hew & Brush, 2007; Mesecar, 2015). Online academic content was another benefit of integrated technology because online content was more up-to-date, while the publishing process used for printed textbooks may take years (Collins & Halverson, 2018; Franklin & Bolick, 2007; Hew & Brush, 2007; Mesecar, 2015).

Anglin (2011) stated the ability to utilize technology to individualize classwork for students made a positive difference in student academic achievement. Digitized educational content made it possible to personalize learning for all students no matter their location, academic achievement level, or physical limitations (Collins & Halverson, 2018; Franklin & Bolick, 2007; Hew & Brush, 2007; Institute of Education Science, 2008; Mesecar, 2015). Ferster (2014) stated individualized pacing through the use of curriculum-driven technology tools allowed students to "trade time for academic ability" (p. 160). Students who had already been exposed to the material or were able to grasp concepts quickly had the ability to progress rapidly through the curriculum, while students who struggled with the material slowed down to a pace they set (Ferster, 2014). Sulla (2011) stated curriculum-driven technology proved to be the biggest motivation for student engagement.

The presence of eLearning, online curriculum-driven technology, for the K-12 student population provided students educational options that were not present 20 years before (Collins & Halverson, 2018). Ferster (2014) stated, since the late 1990s, technological capabilities doubled approximately every one-and-a-half years; since the year 2000, the number of people who reported daily use of computers or the internet rose by over 600%. Mesecar (2015) stated schools needed to have curriculum-driven technology to help students become global citizens empowered for the future because human life was a combination of the virtual digital world and the actual physical world. The use of curriculum-driven technology was important to students' futures in a world where more and more emphasis was placed on technology (Kolb, 2017; Magana, 2017; Mesecar, 2015). Magana (2017) stated, "Our digital era has fostered the exponential growth of human global interconnectedness and the digital expression of human knowledge" (p. 10).

Lamb and Weiner (2018) stated curriculum-driven technologies could benefit students in middle grades. Donovan et al. (2010) stated one-to-one digital technologies utilized on the middle school level fostered more student-centered pedagogies. One-to-one digital technology was a digital device given to each student, which allowed them to access digital content (Downs & Bishop, 2012; Lamb & Weiner, 2018). Middle school students were more engaged with the academic content when given access to one-to-one digital technologies (Lamb & Weiner, 2018). Darling et al. (2014) stated the use of technology allowed students to interact with academic content in ways previously unavailable. Curriculum-driven technology aided middle school students as they developed organizational skills, creativity, and individualized learning interests (Donovan et al., 2010; Downs & Bishop, 2012; Lamb & Weiner, 2018).

Barriers to Curriculum-Driven Technology Integration

The Institute of Education Science (2008) stated 100% of all U.S. schools had computers with internet access, and 91% of those computers were for student or teacher instructional use. A discrepancy existed between the amount of technology available to use in U.S. K-12 public schools and the teacher use of that technology for student-focused learning (Dawson & Rakes, 2003; Ertmer, 2005; Ertmer & Ottenbreit-Leftwich, 2010; Hew & Brush, 2007; Hutchison & Reinking, 2010; Inan & Lowther, 2010b; Inan et al., 2010; Kopcha, 2012; Ross et al., 2010). Educator curriculum-driven technology integration practices and pedagogy affected the level of student-focused curriculum-driven technology in K-12 public schools (Culp et al., 2003; Hutchison & Reinking, 2010; Muir-Herzig, 2004; Pritchett et al., 2013; Ross et al., 2010; Sandholtz & Reilly, 2004). Hutchison and Reinking (2010) stated the type of curriculum-driven technology used in most K-12 public school classrooms was not collaborative, student-focused, or high quality. Teacher technology use was either administrative, such as recording grades and sending emails, or as a digital replacement for paper worksheets, instead of being used for high-quality, student-focused instruction (Bauer & Kenton, 2005; Collins & Halverson, 2018; Hutchison & Reinking, 2010; Inan & Lowther, 2010a; Inan et al., 2010; Pritchett et al., 2013; Ross et al., 2010; Sawyer, 2011; Stolle, 2008; Tamim et al., 2011).

Barriers to integrated curriculum-driven technology included teachers' lack of computer proficiency, teachers' beliefs about technology in the classroom, educators' professional development, funding for technology integration, administrative support, and the school district leaders' technology plan (Culp et al., 2003; Dawson & Rakes, 2003; Hutchison & Reinking, 2010; Inan et al., 2010b; O'Dwyer et al., 2004; Pritchett et al., 2013; Ross et al., 2010; Sawyer, 2011; Stolle, 2008; Tamim et al., 2011). Teachers identified administrative support, teacher beliefs, and professional development as having the greatest impact on their integration of curriculum-driven technology (Dawson & Rakes, 2003; Ertmer, 2005; Ertmer & Ottenbreit-Leftwich, 2010; Hew & Brush, 2007; Hutchison & Reinking, 2010; Inan et al., 2010; Kopcha, 2012; Pritchett et al., 2013; Ross et al., 2010; Sandholtz & Reilly, 2004; Sawyer, 2011).

Hutchison and Reinking (2010) conducted a study in which they identified barriers that prevented the integration of curriculum-driven technology in K-12 literacy classrooms. The study included 1,441 literacy teachers representing 31 different U.S. states (Hutchison & Reinking, 2010). The researchers developed a Likert-scale survey of 22 questions specifically focused on teachers' perceived barriers to integrated technology. The research questions were embedded in a larger 80-question survey about teachers' instructional beliefs (Hutchison & Reinking, 2010). The researchers identified the top three barriers to technology integration for 50% or more of the responding teachers teachers' beliefs about the usefulness of integrated technology, teachers' beliefs about learning, and teachers' lack of technology knowledge (Hutchison & Reinking, 2010). Hutchison and Reinking's results matched the overarching theme identified in Kopcha's (2012) study, where Kopcha sought to identify the teacher perceived barriers to integrating curriculum-driven technology. Kopcha conducted this study in a K-5 school of 600 students and 30 teachers, with 18 teachers participating. The qualitative research, conducted through focused interviews, revealed professional development, teacher beliefs about technology integration, and instructional leadership specific to technology were the top three identified teacher barriers to integrating curriculum-driven technology (Kopcha, 2012).

ACOT II researchers stated too many K-12 schools lacked a principal who was a strong instructional leader (Apple, Inc., 2008, Hutchison & Reinking, 2010; Lawless & Pellagrino, 2007; Murphy & Gunter, 1997). High quality and ongoing professional development was necessary for teacher implementation and mastery of integrated curriculum-driven technology (Anglin, 2011; Ertmer & Ottenbreit-Leftwich, 2010; Hutchison & Reinking, 2010; Sandholtz & Reilly, 2004; Sulla, 2011). Additionally, teachers needed to not only possess technology skills but also *believe* they had the skills and knowledge to effectively integrate curriculum-driven technology (Ertmer, 2005; Hutchison & Reinking, 2010; Kopcha, 2012; Lawless & Pellagrino, 2007; Pritchett et al., 2013). School district leaders and administrators, who wanted to increase the use of technology as a tool for learning instead of simply as a tool for the delivery of instructional material, needed to provide professional development that demonstrated instruction in, and provided ongoing support of, curriculum-driven technology integration to increase the support for, and the pressure to use, curriculum-driven technology as an integrated component of academic lessons and to increase the availability of instructional technology within the class and school (Dawson & Rakes, 2003; Ertmer, 2005; Hew & Brush, 2007; Kopcha, 2012; Inan & Lowther, 2010a, 2010b; Inan et al., 2010; O'Dwyer et al., 2004; Ross et al., 2010). Ross et al. (2010) stated principals who served as instructional leaders in schools were expected to not only provide leadership in instructional practices but also in the implementation of integrated technology.

Administrator Leadership of Curriculum-Driven Technology Integration

Leithwood and Riehl (2003) stated school principals must be prepared to navigate their school communities through a complex web of academic standards, government laws and policies, and student needs, while providing instructional leadership and professional development for teachers. *A Nation at Risk* sparked a national educational reform movement that led to the development and enactment of NCLB (2002) and ESSA (2015), which enlarged the traditional responsibilities of principals. Historically, principals' leadership responsibilities were primarily managerial (e.g., overseeing school buses, school buildings, teacher job performance, student behavior) (Davis et al., 2005; Gray et al., 2007; Lashway, 2003; Leithwood & Riehl, 2003; Maxwell, 2015; NAESP, 2008; Van Roekel, 2008). After Congress enacted NCLB (2002) and ESSA (2015), principals were also expected to be instructional, assessment, and academic leaders (Davis et al., 2005; Gray et al., 2007; Lashway, 2003; Leithwood & Riehl, 2003; Maxwell, 2015; Van Roekel, 2008).

Principals' updated duties included conducting teacher evaluations, acting as liaisons to the public and business communities, developing budgets, providing educational technology leadership, and overseeing the administration of state and federal education programs (Davis et al., 2005; ESSA, 2015; Gray et al., 2007; Lashway, 2003; Leithwood & Riehl, 2003; Maxwell, 2015; NAESP, 2008; Van Roekel, 2008). The legislation in NCLB (2002) and ESSA (2015) caused education to become more complex and multifaceted, resulting in an increase of administrator's responsibilities from their pre-NCLB and ESSA expectations, yet in most school districts, the role of the administrator had not been restructured to include more district support or professional development for administrators (Alvoid & Black, 2014; Davis et al., 2005; Dunham, 2012; ESSA, 2015; Garcia et al., 2013; Maxwell, 2015; NAESP, 2008; National College for School Leadership, 2006; NCLB, 2002; Van Roekel, 2008). Lashway (2003) stated principals were held ultimately responsible for school improvement through both their managerial and instructional roles.

Davis et al. (2005) defined an instructional leader as a school leader who oversaw curriculum, evaluated teachers, monitored teacher professional development, oversaw the administration of high-stakes assessments, and set an expectation for high academic achievement. NCLB and ESSA mandated school administrators were required to be evaluated by school district and state leaders on school achievement data, which highlighted how important it was for principals to be effective instructional leaders (Chaudhuri, 2016; Davis et al., 2005; ESSA, 2015; Garcia et al., 2013; Lashway, 2003; Mead, 2011; NCLB, 2002; Van Roekel, 2008). Lashway (2003) stated principals acted as an instructional leader when they implemented any initiative that positively affected school improvement. Administrators needed support in meeting all their job responsibilities when faced with implementing increasingly rigorous academic standards, new and multifaceted computer-based assessments, and revamped teacher-evaluation systems (Alvoid & Black 2014; Chaudhuri, 2016; Davis et al., 2005; Gray et al., 2007; Maxwell, 2015; Mead, 2011; Reeves, 2006). The multiple roles of an administrator encompassed all the managerial, financial, organizational, and disciplinary components in addition to the requirement, added by NCLB and ESSA, of the role of technology integration leaders (Alvoid &

Black, 2014; Davis et al., 2005; Dawson & Rakes, 2003; Maxwell, 2015; Mead, 2011).

Principals found it difficult to successfully accomplish the multifaceted, numerous, and intricate demands of the 21st century school principal (Alvoid & Black, 2014; Davis et al., 2005; Gray et al., 2007; Leithwood & Riehl, 2003; Mead, 2011; Van Roekel, 2008). Marzano et al. (2005) stated for principals to provide support for teachers' professional development, school district leaders needed to provide principals with professional development focused on how to be instructional leaders. School district leaders needed to provide principals with the autonomy to reallocate both monetary resources and personnel so principals could meet the building management and instructional leadership demands of their job (Alvoid & Black, 2014; Gray et al., 2007; Marzano et al., 2005; Mead, 2011; Reeves, 2006; Van Roekel, 2008). School principals needed to focus on becoming better instructional leaders by providing professional development in the areas of curricular instruction strategies and curriculum-driven technology integration for teachers; however, the transition away from their role as building managers proved to be difficult due to time constraints, lack of resources, lack of training, and lack of support (Alvoid & Black, 2014; Davis et al., 2005; ESSA, 2015; Mead, 2011; National College for School Leadership, 2006; NCLB, 2002; Van Roekel, 2008).

Effectively integrating curriculum-driven technology to the academic curriculum was not a choice but a mandate given to school district leaders, administrators, and teachers by local, state, and federal agencies (Chaudhuri, 2016; Cravens et al., 2017; Davis et al., 2005; Dawson & Rakes, 2003; ESSA, 2015, NCLB, 2002; U.S. Department of Education, 2001a, 2001b, 2005). In addition to NCLB and ESSA legislative requirements for curriculum-driven technology integration, the leading international educational technology organization ISTE (2016) developed standards for educational technology integration. ISTE was a community of educators from around the world who believed the effective integration of technology in the curriculum was key to transforming teaching practices and developing personalized learning opportunities for students (ISTE, 2016). ISTE's (2018) governing committee developed technology standards for districts, principals, teachers, and students and created standards outlining best practices for curriculum-driven technology in education, including expectations for principals to act as instructional and technological leaders in their buildings and for school district leaders to support administrators and teachers in integrating curriculum-driven technology to the curriculum. ISTE's (2018) standards for principals included procuring up-to-date technology equipment, providing professional development for teachers, being a technology advocate, and ensuring teachers were using technology for student-focused instruction and not just for administrative tasks.

Principals, already burdened with many managerial and instructional leadership responsibilities, were tasked with becoming curriculum-driven technology integration leaders (Chaudhuri, 2016; Davis et al., 2005; Dawson & Rakes, 2003; Dunham, 2012; ISTE, 2016; Kowal & Steiner, 2007; Lashway, 2003; Maxwell, 2015; Mead, 2011; Sheng et al., 2017; Sweeney & Mausbach, 2019; Van Roekel, 2008). The ESSA (2015) legislation mandated states and school district leaders to provide professional development for principals, school leaders, and teachers to effectively utilize curriculum-driven technology for quality, rigorous, personalized student learning (Mesecar, 2015; Reynolds et al., 2016, U.S. Department of Education, 2016). Dunham (2012) stated principals had an important role in the integration of curriculum-driven technology, as principals were responsible for providing support to teachers as teachers learn how to effectively utilize curriculum-driven technology. Instructional coaching positions began to appear in the mid 1980s, in large public-school districts located in cities such as New York, New York, and Chicago, Illinois, to meet the demands made on principals and the expectations for school district leaders to provide support for principals as they, in turn, provided support and guidance for teachers (Anderson et al., 2014; Davis et al., 2005; Kowal & Steiner, 2007; Makibbin & Sprague, 1993; Maxwell, 2015; Mead, 2011; Sheng et al., 2017; Sweeney & Mausbach, 2019; Van Roekel, 2008). School district leaders and principals began to utilize these instructional coaches to help bridge the gap between principals' time constraints and instructional leadership responsibilities (Chaudhuri, 2016; Davis et al., 2005; Dawson & Rakes, 2003; ISTE, 2015; Kowal & Steiner, 2007; Lashway, 2003; Maxwell, 2015; Mead, 2011; Quintero, 2019; Sheng et al., 2017; Sweeney & Mausbach, 2019; Van Roekel, 2008).

Instructional Coaching

Anderson et al. (2014) stated there was no one definition for instructional coaches, but generally, instructional coaches were teachers, who were either out of the classroom or teaching part time, who mentored and assisted other teachers to improve instructional practices in a non-evaluative manner. In the years following Congress's reauthorization of ESEA, through the enactment of NCLB in 2002 and its replacement ESSA in 2015, the use of instructional coaches spread from large school districts in big cities to school districts of all sizes across the United States (Garcia et al., 2013; Kowal & Steiner, 2007; Makibbin & Sprague, 1993; Walkowiak, 2016; WestEd National Center for Systemic Improvement [WestEd], 2018). In the early 2000s, 60% of K-12 public schools in the United States utilized an instructional coach in at least one academic content area (Kowal & Steiner, 2007). The use of instructional coaches in U.S. K-12 public schools was perceived by school district leaders as a way to meet the NCLB requirement placed on school district leaders to create and implement improvement plans (Bass & Eynon, 2009; Davis et al., 2005; Denton & Hasbrouck, 2009; Gallucci et al., 2010; Garcia et al., 2013; Huguet et al., 2014; Knight, 2009; Kowal & Steiner, 2007; Kretlow & Bartholomew, 2010; Metz, 2015; NCLB, 2002). NCLB recommended school improvement plans include ongoing focused professional development and specifically named instructional coaching as a method to help struggling schools improve (Davis et al., 2005; Gallucci et al., 2010; Garcia et al., 2013; Huguet et al., 2014; Knight, 2009; Kowal & Steiner, 2007; Kretlow & Bartholomew, 2010; Metz, 2015; NCLB, 2002; Quintero, 2019; Sheng et al., 2017). NCLB legislation required extended professional development activities for teachers that focused on instructional content delivery and content knowledge (Garet et al., 2001; Yoon et al., 2007). Instructional coaches served as a catalyst for professional development by meeting teachers where they were and guiding them to the application of new learning within their classrooms (Knight, 2007).

Garet et al. (2001) stated the NCLB legislation recognized the most important factor affecting student achievement was teacher quality. NCLB mandated professional development be provided to teachers to improve their knowledge of curricular content and pedagogy practices to positively affect student achievement (U.S. Department of Education, 2009). The purpose of instructional coaching varied from district to district; some districts used instructional coaching to implement district initiatives or to work with low performing schools, while other districts used instructional coaches to work one-on-one with teachers to develop more professional skills and a greater degree of self-efficacy (Denton & Hasbrouck, 2009; Desimone & Pak, 2017; Gallucci et al., 2010; Garcia et al., 2013; Knight, 2009, 2011; Kowal & Steiner, 2007; Lia, 2017; Quintero, 2019; Walkowiak, 2016). In general, instructional coaches worked with adults to bring professional practices into classrooms to facilitate student academic growth (Gallucci et al., 2010; Knight, 2007, 2009, 2011; Kowal & Steiner, 2007; Lia, 2017; Walkowiak, 2016).

Research on the effect of instructional coaches on teacher professional development and student achievement was hindered by the lack of standardization concerning the job responsibilities and training of instructional coaches (Anderson et al., 2014; Boeshie, 2019; Desimone, 2009; Reddy et al., 2019). Cravens et al. (2017) stated there was not a recognized standard training for instructional coaches in the United States, nor was there one agreed upon set of qualifications to work as an instructional coach. Instructional coaches were hired from all areas of education with varying levels of experience and content knowledge (Cravens et al., 2017; Desimone & Pak, 2017; Reddy et al., 2019; Walkowiak, 2016). The effect of instructional coaches on teacher development and student achievement was hard to determine because the leaders of each school district that had implemented an instructional coaching program developed their programs independently from other school district leaders (Anderson et al., 2014; Boeshie, 2019; Howard & Mozejko, 2015; Huguet et al., 2014; Reddy et al., 2019; Walkowiak, 2016). Anderson et al. (2014) stated an analysis of research on instructional coaches indicated a strong correlation between instructional coaching and improved teacher practice. Instructional coaching was also an effective way to help teachers transfer knowledge from short-term professional development trainings to sustained classroom practice (Anderson et al., 2014; Desimone & Pak, 2017; Horne, 2012; Huguet et al., 2014; Sweeney & Mausbach, 2019; Walkowiak, 2016; WestEd, 2018). Because there were multiple accepted ways to hire, train, and utilize an instructional coach, the instructional coaching experience was different from teacher to teacher (Castleman, 2014; Cravens et al., 2017; Reddy et al., 2019; Walkowiak, 2016). In general, an instructional coach was expected to foster a professional relationship with a teacher to work in partnership to improve the teacher's instructional practices (Anderson et al., 2014; Boeshie, 2019; Cravens et al., 2017; Desimone & Pak, 2017; Horne, 2012; Huguet et al., 2014; Walkowiak et al., 2016). Instructional coaches served as personal instructional leaders for teachers attempting to foster academic achievement for students (Anderson et al., 2014; Bass & Eynon, 2009; Boeshie, 2019; Gallucci et al., 2010; Knight, 2009, 2011; Kowal & Steiner, 2007; Lia, 2017).

Curriculum-Driven Technology Coaches

Federal requirements enacted through ESSA (2015) required school district leaders and principals to provide high-quality, technology-embedded lessons to students and to give teachers access to high-quality curriculum-driven technology professional development (ESSA, 2015; Hew & Brush, 2007; Institute of Education Science, 2008; ISTE, 2015, 2016, 2018; Margolis et al., 2017; Mesecar, 2015; U.S. Department of Education, 2000b, 2001a, 2005, 2016). NCLB (2002) requirements had been written with a focus on school acquisition of technology hardware, developing the infrastructure needed for internet access in all schools, and ensuring all U.S. students had equal access to technology for academic purposes (Barton & Dexter, 2019; Hew & Brush, 2007; Margolis et al., 2017; Mesecar, 2015).

The requirements written into ESSA (2015) expanded the focus to include curriculum-driven technology professional development for school leaders and teachers and to provide curriculum-driven technology lessons to students (Barton & Dexter, 2019; Hew & Brush, 2007; Institute of Education Science, 2008; ISTE, 2015, 2016, 2018; Margolis et al., 2017; Mesecar, 2015; U.S. Department of Education, 2016). ISTE (2015) developed technology integration standards for curriculum-driven technology leadership for district leaders, principals, and teachers. The legislation mandated school leaders move beyond the use of technology as a substitute for the teacher or technology used as a digital workbook (Barton & Dexter, 2019; Darling-Hammond et al., 2014). Professional development centered on technology began as *how-to* sessions, which explained computer hardware or how to use some managerial software, and progressed to professional development about using curriculum-driven software (Barton & Dexter, 2019; Darling-Hammond et al., 2014; Ertmer, 2005; Howard & Mozejko, 2015; Hutchison & Reinking, 2010; Kopcha, 2012; Lamb & Weiner, 2018; Lawless & Pellagrino, 2007; Lewis, 2016; Pritchett et al., 2013).

School district leaders and principals began not only to use instructional coaches to improve teacher practices in specific academic content areas but also to improve their instructional curriculum-driven technology practices (Anglin, 2011; Bauer & Kenton, 2005; Carbonara, 2009; Collins & Halverson, 2018; Ertmer & Ottenbreit-Leftwhich, 2010; Gallucci et al., 2010; Halter & Finch, 2011; Knight, 2009, 2011; Quintero, 2019; Smith, 2006). Instructional technology coaches, also known as curriculum-driven technology coaches, were instructional coaches who specialized in working with teachers to utilize curriculum-driven technology across all curricula (Anglin, 2011; Bauer & Kenton, 2005; Carbonara, 2009; Collins & Halverson, 2018; Ertmer & Ottenbreit-Leftwhich, 2010; Gallucci et al., 2010; Halter & Finch, 2011; Knight, 2009, 2011; Lewis, 2016; Quintero, 2019; Smith, 2006).

Barton and Dexter (2019) conducted a qualitative study of middle school teachers' perceptions of self-efficacy about integrating curriculum-driven technology. Barton and Dexter (2019) focused on teachers from two middle schools located in the midwest United States. The researchers sent an initial survey to teachers asking about the specific type of curriculum-driven professional development in which they had participated; the researchers then sent nine surveys to every teacher (i.e., once a month for nine months) (Barton & Dexter, 2019). The monthly surveys consisted of questions about their curriculum-driven technology self-efficacy and asked them to describe any technology professional development in which they participated during the month

(Barton & Dexter, 2019). Barton and Dexter (2019) selected teacher participants based on their completion of seven of the nine surveys and participation in at least one instance of curriculum-driven technology professional learning. The researchers interviewed the participants and from their responses determined teachers who combined formal curriculum-driven technology professional development (e.g., attending workshops and working with a technology coach) and who also participated in informal, self-directed professional development (e.g,. watching online videos, talking to coworkers, researching curriculum-driven technology) reported the highest perceptions of self-efficacy regarding integrating curriculum-driven technology to the curriculum (Barton & Dexter, 2019). Barton and Dexter (2019) recommended school leaders provide professional development for teachers that combined formal curriculum-driven technology instruction with opportunities for self-directed curriculum-driven technology professional development.

Conclusion of the Review of the Literature

In this literature review, I explored the history of instructional technology, the impact of federal legislation on the use of curriculum-driven technology in education, and the use of instructional coaches to assist teacher professional development in light of the changed role of principals. Curriculum-driven technology that was present and available for instructional purposes in U.S. K-12 public schools was not being used for high-quality and student-focused instruction (Bauer & Kenton, 2005; Collins & Halverson, 2018; Institute of Education Science, 2000). ESSA (2015) mandated high-quality, student-focused, curriculum-driven technology be used in the classroom and required school district leaders and principals to provide sustained professional development to teachers. Principals were viewed as the instructional leaders of the school but lacked the time to provide long-term, personal, curriculum-driven technology integration leadership to all teachers (Chaudhuri, 2016; Davis et al., 2005; Dawson & Rakes, 2003; Dunham, 2012; ISTE, 2018; Kowal & Steiner, 2007; Lashway, 2003; Maxwell, 2015; Mead, 2011; Sheng et al., 2017; Sweeney & Mausbach, 2019; Van Roekel, 2008).

Instructional coaching positions were a way to meet the requirements of NCLB and ESSA for school district leaders to implement and maintain teacher professional development programs (Davis et al., 2005; ESSA, 2015; Gallucci et al., 2010; Huguet et al., 2014; Knight, 2009; Kowal & Steiner, 2007; Kretlow & Bartholomew, 2010; Metz, 2015; NCLB, 2002). Instructional coaches became a bridge between the job demands of principals and the requirement to provide instructional leadership to teachers (Knight, 2009; Kretlow & Bartholomew, 2010; Metz, 2015). Curriculum-driven technology coaches were utilized by school leaders to move teachers and students beyond the use of technology as a substitute for the teacher instruction or technology used as a digital workbook (Barton & Dexter, 2019; Darling-Hammond et al., 2014). Curriculum-driven technology encouraged middle school students to interact more personally with the academic content, identify self-directed learning interests, develop organization skills, and encouraged individual creativity (Donovan et al., 2010; Downs & Bishop, 2012; Lamb & Weiner, 2018). In the next chapter, I described the methodology used to conduct this study to explore one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach.

Chapter III: Methodology

The use of technology provided equal access to information for all U.S. K-12 students, regardless of socioeconomic status and academic ability levels (Ferster, 2014; Franklin & Bolick, 2007; Tamim et al., 2011). Ertmer and Ottenbreit-Leftwich (2010) and the U.S. Department of Education (2000b, 2001a) suggested the federally mandated use of curriculum-driven technology in schools was a 21st century tool essential for effectively educating students. ESSA (2015) placed the responsibility for meeting curriculum-driven technology integration on school district leaders, principals, and teachers. Most principals either did not have the time, or they lacked the skills necessary to lead curriculum-driven technology integration professional development for individual teachers (Inan & Lowther, 2010a, 2010b). District leaders and principals began to employ curriculum-driven technology instructional coaches as a way to support teachers by providing curriculum-driven technology professional development (Chaudhuri, 2016; Dawson & Rakes, 2003; Kowal & Steiner, 2007; Lashway, 2003; Maxwell, 2015; Mead, 2011; Sheng et al., 2017; Sweeney & Mausbach, 2019; Van Roekel, 2008).

There was little research available that specifically focused on integrating curriculum-driven technology of curriculum-driven technology coaching and its influence upon middle school teachers' practice or perceptions of self-efficacy due to the lack of standardized instructional coach hiring, training, and evaluative measures (Anderson et al., 2014; Knight, 2007, 2009; Kowal & Steiner, 2007; Wallowiak, 2016). To fill the gap in research, the purpose of this basic interpretive qualitative study was to explore middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in the academic curriculum after collaborating with a curriculum-driven technology coach.

Research Design

Merriam and Tisdell (2015) stated research, in its most basic form, was a systematic process by which the researcher learned more about something before engaging in the research process. Qualitative researchers asked questions to understand people's experiences relative to a specific context and through their own words, versus quantitative research, which attempted to deduce people's experiences by analyzing numerical data sets (Creswell, 2012, 2014; Merriam & Tisdell, 2015). Merriam (2002) stated, in qualitative research, meaning was constructed through the social interactions of individuals and interactions with their environment. The value of qualitative research was in researching a phenomenon with unclear or undeterminable variables (Creswell, 2012, 2014).

A basic interpretive qualitative research approach was a research design, initially derived from psychology and philosophy, in which questions were asked to understand the participants' experiences relative to a shared phenomenon (Creswell, 2012, 2014; Merriam & Tisdell, 2015; Peoples, 2020). In this study, I documented middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach by utilizing a 10-question questionnaire. I designed the questionnaire as a combination of close-ended and open-ended questions delivered to the participants through an online digital platform.

Merriam and Tisdell (2015) stated a person's experience could not be separated from the way in which that experience was received and interpreted. Researchers used basic interpretive qualitative study design to understand people's perceptions or perspectives regarding any given experience or situation (Bhattacherjee, 2012; Peoples, 2020). Basic interpretive qualitative research assumed multiple interpretations of a phenomenon because reality was socially constructed and did not exist outside of a given context (Bhattacherjee, 2012; Creswell, 2012, 2014; Merriam & Tisdell, 2015). Basic interpretive qualitative researchers viewed social reality as embedded within social settings; meaning was derived from a sense-making process through the participants' descriptions and perceptions (Bhattacherjee, 2012; Merriam, 2002).

Role of the Researcher

Merriam (2002) stated the researcher was the primary instrument for data collection in basic interpretive qualitative research. Being the primary data collector allowed me to analyze data as they were collected (Merriam, 2002; Merriam & Tisdell, 2015). In this basic interpretive study, I developed a 10-question questionnaire and collected the responses of 33 teachers from three middle schools within a southeastern school district. Through the participating middle school teachers' responses, I explored the teachers' perceptions of the importance of curriculum-driven technology and their perceived ability to integrate curriculum-driven technology to instructional practice after working with a curriculum-driven technology coach. In this study, I acted as the sole agent of data collection through a web-based questionnaire, in which I provided a format in which each participant received the same question, worded the same way, and delivered without bias from my facial expressions, voice fluctuations, and knowledge of the curriculum-driven technology coaching program. I continuously performed self-evaluation of my potential bias because, in qualitative research, the researcher was the greatest threat to credibility due to procedures, data collection methods, and methods of data analyzation and interpretation (Merriam & Tisdell, 2015).

Ethical Considerations

Through this study, I explored 33 middle school teachers' perceptions of the importance of curriculum-driven technology and teachers' perceived ability to integrate curriculum-driven technology to their curricula after working with a curriculum-driven technology coach. I created a questionnaire using Google Forms, a web-based instrument used for designing questionnaires and assessments. The Google Form I created did not collect biographical data, email addresses, or names of those who completed and submitted a survey. Participants were provided with an implied consent form that explained their rights and ensured their confidentiality in the interest email, which I sent to all middle school teachers working in the three participating BSD middle schools. When participants submitted their questionnaire, I assigned each participant a unique coded label to preserve their confidentiality. I informed the participating teachers that this study was entirely voluntary and, if they did participate, they had the right to withdraw at any time. I informed participants that withdrawing or not participating in the research study did not negatively affect their position within their school, school district, or Lincoln Memorial University. Participants were also informed no personal information would be collected from the survey, and their responses would be kept confidential. I assured participants any report related to this research would not contain names or any other information by which they could be identified.

Potential Bias

I was a full-time classroom teacher and curriculum-driven technology coach, known as a TTL, in the BSD school district. I provided whole school, curriculum-driven technology professional development in the afternoons one to two times a month. Additionally, I provided ongoing, small-group or individual, professional development as often as the teacher(s) requested my assistance. BSD leaders placed two curriculum-driven technology coaches at each of the four middle schools within the district. BSD required TTLs to provide four school-wide, after school, curriculum-driven professional development sessions in a school year. BSD teachers were encouraged, but not required, to attend these after school professional development sessions. Small-group and individual, curriculum-driven technology professional development sessions between a TTL and a teacher(s) were scheduled when requested by a teacher(s). The individual or small group curriculum-driven technology professional development sessions were strictly voluntary and had no requirements concerning duration of a session or number of session meetings. As a BSD TTL, I have worked with 37 different teachers and teachers' assistants from 2016 to 2020. The curriculum-driven technology coach program was uniformly implemented throughout the school district in the fall of 2016.

I did not invite teachers to participate in the study if I had personally worked with them or if they taught within my school to mitigate potential bias.

My position as a curriculum-driven technology coach provided me with a unique knowledge base, which allowed me to develop questions and explore teachers' experiences and perceptions by using a shared culture of technology vocabulary and school district leaders' expectations. I controlled for potential bias during the data collection phase of research by having all communication, including questionnaire responses, routed through my Lincoln Memorial University email instead of my school email. Acknowledging and monitoring any potential biases enabled me to "make clear how they may be shaping the collection and interpretation of data" (Merriam & Tisdell, 2015, p. 16). I created an honest and open interpretive research study by controlling for bias (Creswell, 2014).

Participants of the Study

I developed this study's criterion sampling from the population of middle school teachers in BSD, which was located in the southeastern region of the United States. The rural school district was comprised of 21 schools that served approximately 10,500 students from pre-Kindergarten through grade 12. BSD became a digital technology and device-driven district in 2016, at which time district leaders provided a Chromebook to each student in grades 6-8, pledged to provide a Chromebook to each student in grades 3-5 and grades 9-12, adopted a digital science textbook, and mandated district-wide common digital assessments. I chose this district for my study because of the combination of digital tools mentioned above and BSD leaders' creation and utilization of a curriculum-driven technology coaching program, known as the TTL program.

Coaches in the TTL program supported teachers as they transitioned to digital instructional platforms and learned to deliver integrated curriculum-driven technology lessons. Two TTLs were chosen to serve each of the BSD's four middle schools. The TTLs were given periodic, ongoing training in instructional coaching, curriculum-driven technology, educational technology trends, and non-technology lessons transitioning to technology-based lessons. District leaders used professional development activities, monthly group meetings, leadership trainings, technology trainings, and participation in curriculum-driven technology workshops and conferences to provide TTLs with instruction in teaching adult learners and collaboration techniques. All middle school TTLs remained full-time teachers within varied academic content areas. TTLs were chosen through a three-step interview process that began at the school level with the principal and ended in an interview and mock curriculum-driven technology lesson with district leaders. The TTL program was created through a five-year grant from the U.S. Department of Education and provided a stipend of $1,500 dollars a year to each TTL.

BSD had four middle school schools, which served approximately 2500 students in grades 6-8 and employed eight administrators and 139 teachers. To limit researcher bias, the middle school in which I served as a TTL was excluded from the study; therefore, I included teachers from three BSD middle schools in this study. Combined, there were approximately 100 teachers working in the three middle schools which served approximately 1,700 students. I chose BSD middle school teachers for this study because, in 2016, middle school students were the first to each be provided with a Chromebook, and the middle school teachers were the first to have access to TTL services. In 2017, high school students were provided individual Chromebooks, and students in grades 3-5 received their individual Chromebooks in 2018.

Data Collection

I began data collection for this study by asking for research permission from the BSD superintendent and the three middle school principals. After I received permission from both the superintendent and all three principals, I submitted a research approval request to Lincoln Memorial University's Institutional Review Board (IRB). When IRB approval was granted, I invited 112 middle school teachers to participate in the study via email, reminded them participation was voluntary and assured them their questionnaire responses would be kept confidential.

Permissions and Consent

I requested permission to conduct the study, via email, from the superintendent of BSD (see Appendix A). After receiving the superintendent's written permission, I contacted the three middle school principals from the participating schools via email. I explained the study and requested permission to invite the teachers working for each of the three middle schools to participate in the study (see Appendix B). After I received permission from the three middle school principals, I printed the approved permission letters and stored them in a locked file cabinet. The file cabinet was located in my private home and accessible to only me. After receiving permission to conduct the study from the BSD superintendent and the three BSD middle school principals, I submitted a research approval request to the IRB. After IRB approval was received, I sent an email to each of the six TTLs at the participating three middle schools; in this email, I explained the purpose of my research, stated the school superintendent and principals' permission to conduct the study. I requested the teachers' email from the TTLs because BSD was in the process of changing their email server and was not able to provide a correct and complete list of teachers' email addresses. After I received the email lists, I then emailed the teachers and explained the purpose of my research and stated the school superintendent and principals' permission to conduct the study. I also included in the email an assurance to the teachers of confidentiality, my contact information, the implied consent statement, and the link to the research questionnaire (see Appendix C).

Questionnaire

Goddard and Villanova (2006) stated in the social sciences, questionnaires were a popular choice for gathering data because questionnaires provided a way for individuals to self-report their experiences and feelings. The questionnaire consisted of three close-ended questions designed in a multiple choice format and seven open-ended questions (see Appendix D). A questionnaire was initially chosen as the data collection instrument due to the three different school locations, the number of potential participants, and teachers' varied teaching schedules; however, using a questionnaire became mandatory after BSD restricted access to the three middle school campuses to only the employees and students at each middle school to avoid spreading the COVID-19 virus.

Based on the Governor's mandate, BSD leaders canceled all in-person instruction system-wide in the spring semester of 2020. In the 2020-2021 school year, BSD leaders mandated new policies limiting in-person meetings and banned visitors on school campuses to protect students and teachers from contracting

COVID-19. This included teachers and staff being banned from visiting school campuses where they did not work. Questionnaires could be answered in any setting, at any time, and alone or in groups (Creswell, 2012; Goddard & Villanova, 2006). Anonymous web-based questionnaires may have facilitated participant self-disclosure through a greater willingness to provide honest and detailed information due to the increased comfort level associated with anonymity (Goddard & Villanova, 2006).

I developed the questionnaire using Google Forms, a web-based platform that was part of the Google Suite of Applications (Apps). BSD was a Google Apps for Education district, which meant the district required the use of Google Apps for all school documents, emails, and websites. The Google Forms digital questionnaire was a format with which the 112 middle school teachers were familiar, as BSD required it for use in the teachers' classrooms and in district-level professional development. The Google Forms web-based questionnaire allowed teachers to participate in the study at a time of their choosing, with any internet connected device, and without the need to mail responses back to me (Creswell, 2012; Merriam & Tisdell, 2015).

I developed the questions used in the questionnaire based on my literature review and to answer the two research questions posed in this study. I developed the questionnaire questions to align with the purpose of the study. I used criterion sampling to ensure middle school teachers who volunteered to participate in the study were middle school teachers within the BSD school district, had access to a curriculum-driven technology coach, and had the same district expectations and directives regarding curriculum-driven technology. I provided clear implied consent statements that advised all participants of their rights and guaranteed the participants' confidentiality.

Pilot Testing

I conducted a pilot test to establish the validity of the research questionnaire (Creswell, 2012, 2014; Merriam & Tisdell, 2015). I invited 10 BSD middle school teachers from the one middle school excluded from the study to participate in the pilot test. I excluded this school and its teachers to avoid potential bias because I worked as a classroom teacher and curriculum-driven technology coach at this same school in the 2020-2021 school year. I sent an email in which I requested volunteers to participate in the pilot questionnaire. I explained the purpose of my study, discussed the need to pilot test my questionnaire to receive sample question responses, and asked for any recommended revisions.

Of the 10 teachers who were eligible, eight agreed to participate and were sent a link to the pilot test questionnaire. The participants were asked to complete the questionnaire and email me with any feedback concerning test structure, question formatting, and the questions themselves. I used the feedback to adjust the wording of the questions, add or delete questions, and adjust the structure of the test (Creswell, 2012, 2014; Merriam, 2002; Merriam & Tisdell, 2015). Pilot test feedback from one participant indicated confusion about the use of the word *effectively* in question five, which originally stated, '*Has working with a curriculum-driven technology (TTL) coach influenced your beliefs about your ability to effectively use curriculum-driven technology, and if so, how?'* I decided the term *effectively* was too ambiguous and could lead to a misinterpretation of the meaning of the question. This was an example of the type of participant feedback I received. The questionnaire was edited and the term was removed from the final version used in the research study.

Administering Questionnaire

At the end of January 2021, I sent an email to each of the six TTLs at the participating three middle schools, in which I explained the purpose of my research and stated the school superintendent and principals' had provided permission to conduct my research study. I requested the TTLs send me a list of the teachers' emails from their respective schools. I then sent an email to the teachers, in which I included an explanation of the purpose of my study, stated the school superintendent and principals' permission to conduct the study, and attached a document that included my contact information, the implied consent statement, and the link to the research questionnaire. The questionnaire remained open for teacher responses for six weeks. After the questionnaire was open for three weeks I emailed all teachers from the three participating middle aas a second request to the middle school teachers for their participation in the research study. I provided the information that the questionnaire would be closing in three additional weeks. Thirty-three teachers participated int eh study.

Methods of Analysis

The purpose of basic, interpretive, qualitative research was to explore the experience of the participants through the lens of a particular phenomenon (Creswell, 2014; Merriam, 2002; Merriam & Tisdell, 2015). Data analysis should be systematic, purposeful, and make sense of the data collected (Creswell, 2014; Merriam, 2002; Merriam & Tisdell, 2015). Merriam (2002) stated basic interpretive qualitative research data analysis was emergent and changed as data were collected.

I assigned all 33 respondents a unique coded label immediately upon receipt of their responses. I used the same code for each of the participants in all research reports and my final dissertation document. I analyzed data as they were submitted in an ongoing, inductive, and comparative process that evolved as common themes emerged from the data (Merriam, 2002; Merriam & Tisdell, 2015). I read the participants' responses and noted any words, phrases, themes, or ideas I thought might be important and relevant to the research questions (Creswell, 2014; Merriam & Tisdell, 2015).

From the initial reading of participants' responses, I categorized similar comments or ideas and assigned each category a code, or name, that represented that category in a process called open coding until I reached the point of data saturation (Creswell, 2015; Merriam & Tisdell, 2015). I reached data saturation when the participants' responses contained no new or unique themes (Merriam, 2015). After open coding, I combined similar codes into narrower axial codes by interpreting the meaning of and the relationship among the open codes. I used axial codes to develop selective codes, which answered each research question (Merriam & Tisdell, 2015). I linked the selective codes within and between each research question to develop a narrative that represented (Creswell, 2014; Merriam & Tisdell, 2015) one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach.

Trustworthiness

Creswell (2012) stated concerns with web-based questionnaires could include email server changes and security issues. In this study, the criterion sample were all teachers within the same school district who used a school-issued email address housed on a stable webserver maintained by the district. The district email accounts were encrypted and password protected. All research participants received an identical questionnaire through their school email accounts. By using a web-based questionnaire and not conducting in-person interviews, I mitigated any potential bias that may have resulted from my knowledge of the TTL program and the school district's technology directives.

The trustworthiness of the questionnaire was strengthened by the use of Google Forms as the formatting program for the questionnaire. BSD was a Google Apps For Education school, which meant the district required all teachers to use Google products for their technology needs. BSD routinely sent teachers Google Forms questionnaires. Participants' familiarity with the Google Forms platform helped ensure the trustworthiness of the questionnaire. I created a restricted Google Forms questionnaire only available to teachers given the link and was not available in an internet search or as a link on a website. Upon submission of the questionnaire the participants' responses were secured on my password-protected account. The credibility of the study was partially achieved through the triangulation of data, accomplished by securing and analyzing data from teachers from three middle school faculties (Bhattacherjee, 2012; Merriam & Tisdell, 2015). I used as much detail as possible when I described my research methodology to ensure study dependability (Bhattacherjee, 2012). I also included instructions for sending any questions or comments the participants might have about the data analysis or results directly to my email address. I created this opportunity of confirmability by the participants and to help establish trustworthiness (Bhattacherjee, 2012; Merriam & Tisdell, 2015). I established the transferability of this study by thoroughly describing my methodology decisions and data analysis techniques (Merriam, 2002; Merriam & Tisdell, 2015).

Limitations and Delimitations

Creswell (2012) stated limitations were things that may happen in a study but were not under the researcher's control. Study limitations were recognized and mitigated by me during the study (Creswell, 2012; Roberts, 2010). A limitation of my study was the occurrence of the COVID-19 virus. In March of 2020, the spread of COVID-19 prompted the halt of in-person academic instruction for all K-12 schools in the state, which continued through the end of the 2019-2020 school year (Kast, 2020). The state's governor required all K-12 school faculty and staff to stay home and not return to the school building (Kast, 2020). BSD was closed to in-person instruction from March 2020 through May 2020. In BSD, the in-person school closures meant teachers were required to teach from home and entirely online using curriculum-driven technology. Curriculum-driven technology coaches for BSD developed online professional development and provided resources to help teachers use curriculum-driven technology entirely online.

Due to the COVID-19 school closures, I was unable to complete the study in the spring of 2020. In late January of 2021, I administered my questionnaire to the participants from the three participating middle schools. The necessity of teaching online may have influenced questionnaire responses because from March of 2020 through May of 2020, the one-on-one curriculum-driven technology coaching sessions were no longer in person nor delivered on a regular basis, which may have caused them to be shorter in length, less personal, or less helpful. I mitigated for this limitation by increasing my study timeframe to encompass fall and winter of 2019-2020 and the fall of 2020.

Delimitations of the study that could have affected the results stemmed from decisions I made when developing the research methodology for the study (Creswell, 2012; Peoples, 2020). Delimitations that may have limited the scope of this study included the criterion sampling of potential participants; I limited the potential participants to middle school teachers teaching for the BSD, which excluded teachers from other school districts and other grades. I chose the BSD because of my knowledge of their technology policies and TTL program, and I limited the potential participants to middle school teachers because middle school teachers had participated in the TTL coaching program longer than either elementary or high school level teachers in BSD.

Another delimitation of my study design was the use of a web-based questionnaire to collect data, which may have limited the responses from participants due to the close-ended and open-questions in the questionnaire (Goddard & Villanova, 2006). Participants could only answer the questions I asked, which may not have fully represented what a participant wanted to share about their perceptions of curriculum-driven technology and their perceptions of the importance of curriculum-driven technology and their ability to integrate instructional technology after working with a curriculum-driven technology coach

(Goddard & Villanova, 2006). Another possible disadvantage of the web-based questionnaire was there was no way for me to answer questions, clarify survey items, or address any technical issues that may have arisen (Selm & Jankowski, 2006). I mitigated this delimitation by conducting a pilot test of my questionnaire with another group of middle school teachers from BSD who had worked with a curriculum-driven coach in the 2019-2020 and fall of 2020 school years but were excluded from the study.

Assumptions of the Study

Assumptions were present in qualitative research because qualitative research data depended on the participants' self-reporting (Creswell, 2012; Peoples, 2020). Assumptions were hard to prove or control for but could influence research findings (Peoples, 2020). A primary assumption of qualitative research was the existence of multiple realities as perceived through the research participants' experiences (Creswell, 2012; Mirram, 2002; Peoples, 2020).

I assumed all research participants answered the questionnaire to the best of their ability and were completely truthfully from their perspective. I designed the study to ensure participants' anonymity and inspire truthful answers. I do not have any suspicion or proof that one or more research participants answered the questionnaire untruthfully, but there was no way to guarantee all answers were truthful. Another assumption was all curriculum-driven technology coaches had been trained the same way and were given the same opportunities at each BSD middle school to work with teachers. I also assumed all BSD teachers who worked with curriculum-driven technology coaches implemented curriculum-driven technology instruments and coaching suggestions with fidelity.

Summary of Methodology

Research was a systematic process in which the researcher engages in learning more about a particular research topic through the experiences of others (Merriam & Tisdell, 2015). In this chapter, I outlined the methodology I utilized for my research. I obtained permission from the BSD superintendent to conduct research, and I requested and received permission from BSD middle school principals to invite the teachers in their respective schools to participate in this study. Teachers were invited to be participants, informed of their rights, and ensured confidentiality in all data analysis and study-related reports. Thirty-three participants' responses were analyzed using open, axial, and selective coding to develop themes that demonstrated the common narratives one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach. In the next chapter, I presented my analysis of the participants' responses.

Chapter IV: Analyses and Results

Legislation in NCLB (2002) stated instructional coaching could be a sustainable and effective method of supporting teachers' professional development. Instructional coaches' hiring, training, and practices varied from school to school and school district to school district, which made it difficult to determine the effect of instructional coaching on teacher development and student achievement (Anderson et al., 2014; Boeshie, 2019; Castleman, 2014; Cravens et al., 2017; Denton & Hasbrouck, 2009; Huguet et al., 2014; Walkowiak, 2016). Researchers identified instructional coaching as an effective way to help teachers improve instructional practices and transfer short-term professional development trainings to long-term instructional practices (Anderson et al., 2014; Denton & Hasbrouck, 2009; Desimone, 2009; Horne, 2012; Huguet et al., 2014; Sweeney & Mausbach, 2019; Walkowiak, 2016; WestEd, 2018). Curriculum-driven technology coaches were utilized by school district leaders and principals to fulfill the ESSA (2015) requirements to provide teacher professional development for high-quality, student-focused, curriculum-driven technology (Chaudhuri, 2016; Davis et al., 2005; Dawson & Rakes, 2003; Dunham, 2012; ISTE, 2015; Kowal & Steiner, 2007; Lashway, 2003; Maxwell, 2015; Mead, 2011; Reddy et al., 2019; Sheng et al., 2017; Sweeney & Mausbach, 2019; Van Roekel, 2008).

The purpose of this research was to explore one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach. I conducted data collection in three BSD middle schools using a

10-question, online questionnaire emailed to middle school teachers to add to the body of literature on curriculum-driven technology coaches and curriculum-driven technology integration. The questionnaire remained open for teacher responses for six weeks. Responses from 33 BSD middle school teachers had been collected when the questionnaire closed.

Data Analysis

I used criterion sampling from the population of middle school teachers in three BSD middle schools located in the southeastern region of the United States. I invited teachers from three BSD middle schools to participate in my research study. I included these middle school teachers because BSD had become a digital technology and device-driven district in 2017. BSD leaders provided a Chromebook to each student in grades 6-8, pledged to provide a Chromebook to all other students in grades 3-5 and grades 9-12, adopted a digital science textbook, and mandated district-wide common digital assessments. Additionally, BSD leaders developed, staffed, and utilized a curriculum-driven technology coaching program, known as the TTL program, to support teachers as they transitioned to digital instructional platforms and integrated curriculum-driven technology lessons. Each BSD middle school had two dedicated TTLs who also held full-time classroom teaching positions.

I analyzed the 33 teacher questionnaire responses using open, axial, and selective coding to develop and refine themes (Merriam & Tisdell, 2015). Themes emerged from comparing individual responses, and I noted similarities in phrases. As each of the 33 teacher responses were collected the responses were given an identification code label and recorded in a separate document. The responses were then analyzed to develop themes through the identification of common ideas and beliefs (Merriam & Tisdell, 2015). My use of open coding generated the largest number of themes from the teachers' questionnaire responses and was narrowed to axial codes derived from reflecting on the meaning of the open codes (Merriam & Tisdell, 2015). I then narrowed axial codes to selective codes, which represented the teachers' most important ideas or beliefs that addressed the two research questions in this study. I uncovered answers to my two research questions from the themes that emerged at the completion of the data analysis.

Of the 33 middle school teachers' responses to question one of the research questionnaire, from the beginning of the 2019-2020 school year through the fall of the 2020-2021 school year, 10 teachers had not worked with a TTL coach at all, 17 teachers responded they had worked with a TTL coach one to two times a month, four teachers responded they had worked with a TTL coach three or more times a month, and one teacher responded they had worked with a TTL coach two or more times a week. The responses of 10 teachers who responded they had not worked with a curriculum-driven technology coach (TTL) were not analyzed to provide answers to my two research questions but their responses were analyzed for indications of why these participants chose not to work with a TTL coach. After I analyzed the individual participant responses, I identified 14 open codes, three axial codes, and two selective code themes that answered Research Question 1. I identified 13 open coded themes, two axial codes, and one selective code theme that answered Research Question 2.

Research Questions

Questionnaire questions two through 10 specifically addressed one or the other research question in this study. The middle school teacher responses to these nine questions were analyzed for development of the main themes that answered the two research questions.

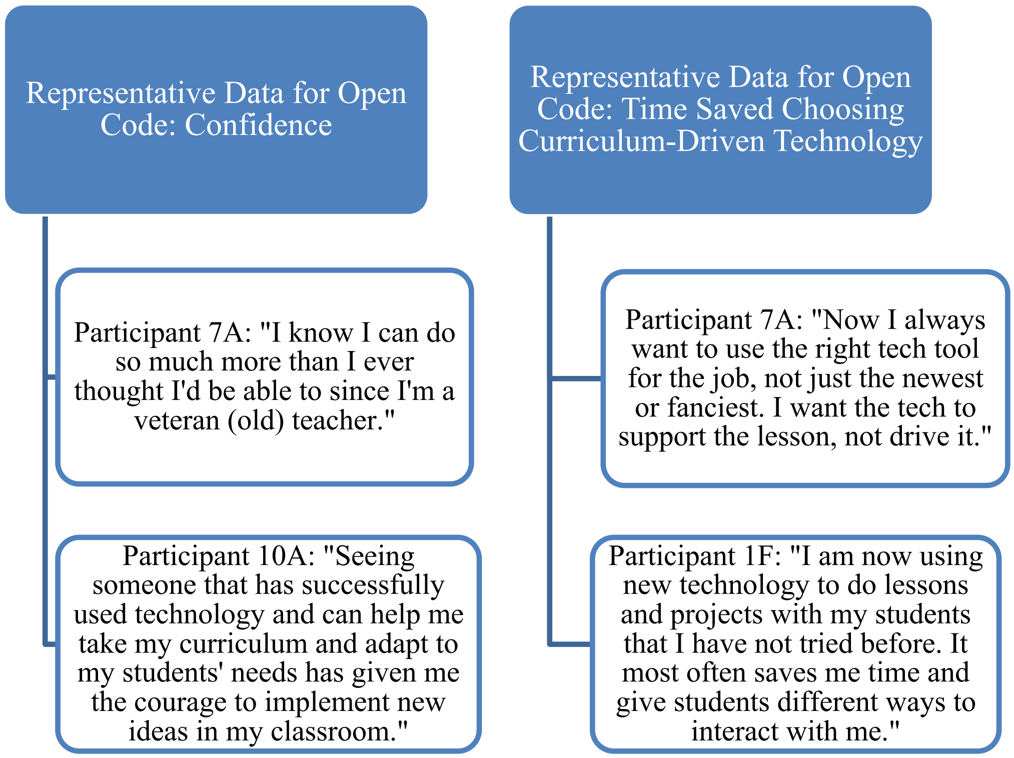
Research Question 1

What are middle school teachers' perceptions of the relationship between collaborating with a curriculum-driven technology coach and the teachers' beliefs or attitudes about their ability to integrate curriculum-driven technology to the curriculum?

Questionnaire questions 3, 4, 5, 9, and 10 were constructed to elicit participant responses that addressed Research Question 1. I developed Figure 1 from representative participant responses, which identified personal confidence using curriculum-driven technology or time saved by choosing curriculum-driven technology.

Figure 1

Sample of Open Code Development for Research Question 1



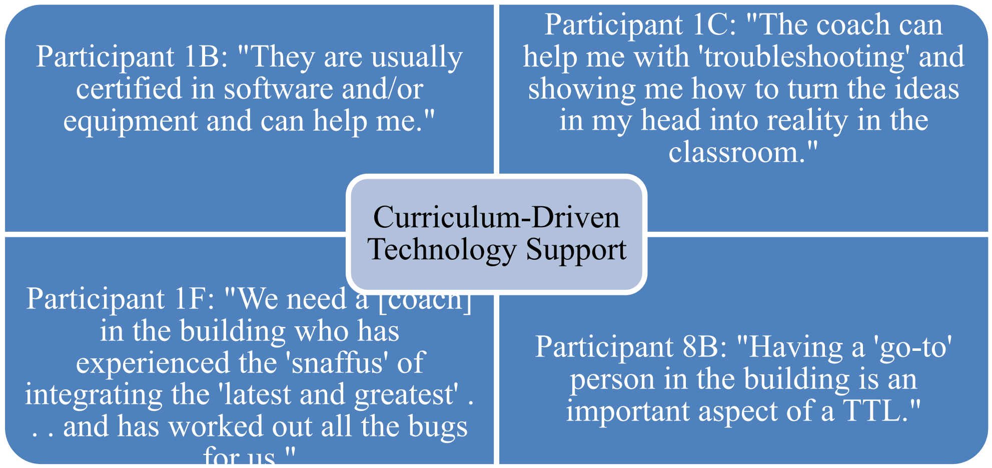
Twenty-three participants responded they had worked with a curriculum-driven technology coach. I analyzed these 23 participant responses and identified open codes by isolating similar words and phrases from participants' responses and grouping them together. I identified 14 open codes from the teachers' responses to questionnaire questions 3, 4, 5, 9, and 10. The codes I identified included troubleshooting problems, technology support, implementing curriculum-driven technology support, instructional support, confidence, personal ability, transformation, comfort, overwhelm, time saved choosing curriculum-driven technology, time saved planning lessons, speed of data analysis, and too many technology choices.

Research participants expressed the ideas of confidence and time saved using curriculum-driven technology. The theme of confidence appeared in 23% of the responses of participants who had worked with a curriculum-driven technology coach, and the theme of time saved choosing curriculum-driven technology appeared in 17% of the participants' responses. Some respondents' comments for a particular question included more than one idea, such as Participant 1C's statement, "It has increased my confidence to try new things . . . and this saves me time on a daily basis." In this statement, the themes of confidence using curriculum-driven technology and time saved were both present. Due to the presence of multiple themes in responses, percentages of identified open codes did not equal 100%. After I developed the 14 open codes, I narrowed the research themes that addressed Research Question 1 to three axial codes: teacher curriculum-driven technology support, teacher beliefs about their ability to use curriculum-driven technology, and teachers' time saved using curriculum-driven technology.

A sample of how I developed an axial code theme was depicted using quotes from four research participants (see Figure 2).

Figure 2

Sample of Axial Code Development



Seventy-five percent of participants who had worked with a curriculum-driven technology coach mentioned the importance of having a curriculum-driven technology coach in the building, while 47% of participants mentioned ideas related to teacher comfort level using curriculum-driven technology. Participant 8E stated, “I have become much more comfortable with using [technology] in my every day teaching.” Sixty-nine percent of the participants mentioned axial code three, time saved using curriculum-driven technology as a result of curriculum-driven technology. Participant 7A stated, “The immediate data provided when assessing with technology is invaluable. It guides my decisions quickly,” and Participant 10A said, “I can now gather data faster . . . than ever before.”

I developed two selective code themes from the three axial codes, one by combining teacher curriculum-driven technology support and time saved using curriculum-driven technology from the axial codes into curriculum-driven technology support. The teachers indicated time saved using curriculum-driven technology was directly related to having received curriculum-driven technology support from a curriculum-driven technology coach. Participant 10A stated, "[T]rying to do this on my own is overwhelming and time consuming. Having someone to go to . . . allows me to get things done faster and be more productive." I developed the second selective code, teacher beliefs about their ability to use curriculum-driven technology, based on the 47% of research participants who mentioned personal comfort level using technology. Participant 8K stated, "Using the TTLs has helped boost my confidence in using technology."

Research Question 2

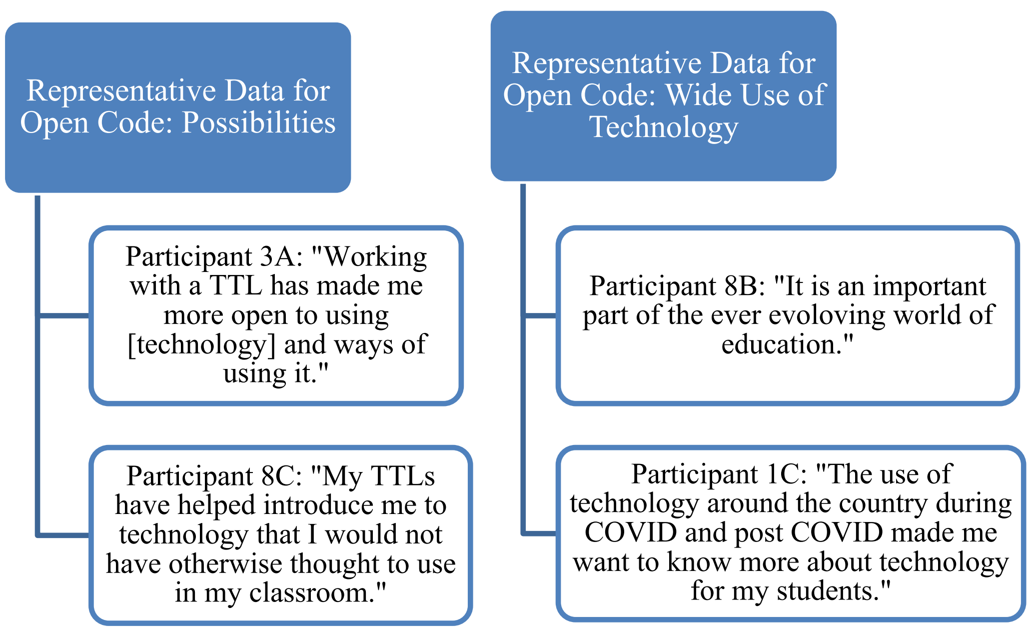
What are middle school teachers' perceptions of the relationship between collaborating with a curriculum-driven technology coach and the importance of integrating curriculum-driven technology to the curriculum?

Questionnaire questions 2, 6, 7, and 8 were constructed to elicit participant responses that addressed Research Question 2. I identified 13 open codes, three axial codes, and one selective code theme from the participants' responses to answer Research Question 2. The open codes concerning curriculum-driven technology were possibilities, importance, usefulness, overused, effective use, assessment data, differentiated instruction, and remediation. Over-used curriculum-driven technology referred to the use of curriculum-driven technology in every instructional situation. Open codes regarding curriculum-driven technology coaches were classroom teachers, knowledgeable, and building level coaches.

The two most mentioned ideas of the 23 participants who had worked with a curriculum-driven technology coach were the possibilities of technology and the wide use of technology. A total of 32% of the participants mentioned the idea of possibilities. Participant 1C stated, “The coach can help me turn the ideas in my head into a reality in the classroom.” Eighteen percent of the participants mentioned the idea of the wide use of technology with comments such as Participant 2A, who stated, “I am now dealing with students [who] thrive in the tech world,” and Participant 8E said, “This [technology] is the way the world is going so we really do have to open our minds to learning new techniques.” Figure 3 provides an example of participant responses that led to the open codes of possibilities and student use of technology.

Figure 3

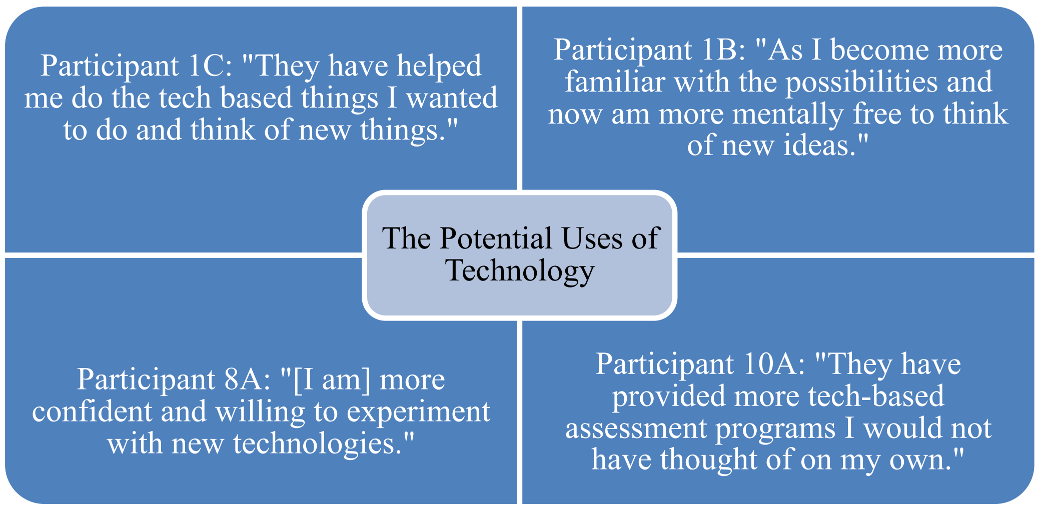
Sample of Open Code Development for Research Question 2



I then looked more closely at the ideas stated in the teachers’ responses and merged the open codes into two axial codes: the potential uses of technology and the reasons for curriculum-driven technology support. I developed one selective code that addressed Research Question 2, the potential of technology to impact learning (see Figure 4).

Figure 4

Sample of Selective Code Development



Participant 2A stated the following:

> I myself am a paper person but, [*sic*] I am now dealing with students [who] thrive in the tech world and working with TTLs pushed me to meet my students in the middle and introduce them to resources that they may interact with better than just paper.

Participant 9A stated, “I was a hold out for many years and am now feeling more open to trying and using different platforms to help student growth.”

Summary of Results

Teachers who participated in the study and said they had worked with a curriculum-driven technology coach provided ways in which the TTLs have guided them through the integration of curriculum-driven technology. I analyzed the participants' responses and narrowed their responses to three themes. Two themes addressed Research Question 1: teacher beliefs about their ability to use curriculum-driven technology and curriculum-driven technology support; and one theme, the potential of technology to impact learning, that addressed Research Question 2.

Of the 33 research participants' responses, 10 participants indicated they had not worked with a curriculum-driven technology coach. Of these 10 participants, four did not continue to answer questionnaire questions, and two answered remaining questionnaire questions with n/a. The other four participants completed the questionnaire, but their responses could not be used to answer the research questions because the participants had not worked with a curriculum-driven technology coach. In the next chapter, I have used the data from this study to draw conclusions, develop generalizations, and make recommendations about the results. I have provided implications for my research results regarding the body of research on curriculum-driven technology coaches, and I have recommended future research possibilities to further examine teacher perceptions of the use and importance of curriculum-driven technology.

Chapter V: Discussion of the Study

The purpose of this research was to explore one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach. In this chapter, I have used the analyzed data from my research study to provide discussion about the two research questions, make recommendations about the results of this research study, and provide recommendations for future research. Overall, the results I derived from my research study indicated curriculum-driven technology coaches positively influenced teachers' perceptions of their ability to use curriculum-driven technology and the importance of using curriculum-driven technology.

To answer my two research questions, I developed a research study using Bandura's (1989) four principles of the social cognitive theory: differential reinforcement, vicarious learning, cognitive processes, and triadic reciprocity as the theoretical framework to explore middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach. I conducted this study using questionnaire responses from 33 middle school teachers from three schools in the BSD school district. At the time of this study, the BSD school district was a one-to-one technology school district (i.e., every student in grades 3-12 was issued an individual Chromebook). Additionally, BSD leaders had developed and utilized a curriculum-driven technology coaching program for all district teachers.

I sent the research questionnaire to BSD middle school teachers and collected responses for six weeks. I collected 33 participant responses, and from an analyzation of those responses, I was able to answer my two research questions.

Teachers said working with a curriculum-driven technology coach made them aware of the importance of using curriculum-driven technology as a regular part of their lesson plans. Teachers also mentioned, while they knew technology was important, after working with a curriculum-driven technology coach, they understood why curriculum-driven technology was important and were introduced to different ways of incorporating curriculum-driven technology to their lessons. Questionnaire respondents mentioned digital textbooks, assessment programs, and interactive concept practice programs. Teachers mentioned the importance of incorporating digital assessments into their content due to the immediate feedback provided to the student and the teacher. Teachers also reported using digital assessment programs to determine student content mastery and using the results from the assessments to have conversations with students about their academic needs.

Teachers mentioned the importance of curriculum-driven technology to help them differentiate their instruction to meet the needs of all students. In this research study, teachers indicated working with a curriculum-driven technology coach helped them realize the importance of using different types of curriculum-driven technology such as Google Forms, Google Classroom, iReady, and Edulastic. Teachers reported the importance of using curriculum-driven technology to plan differentiated lessons. Teacher responses were consistent with previous researchers' findings that identified the need for and the importance of using curriculum-driven technology in academic lessons (Apple, Inc., 2000; Ertmer, 2005; Franklin & Bolick, 2007; Kopcha, 2012; Muir-Herzig, 2003; Ringstaff et al., 1996; Ross et al., 2010; Sandholtz et al., 1994, 1997; Tamim et al., 2011).

I defined curriculum-driven technology as technology used to present curriculum that could be differentiated to meet individual student needs and could be interactive such as digital textbooks, assessment programs, and educational websites (Anglin, 2011; Cauthen, 2020; Ferster, 2014; Franklin & Bolick, 2007; Institute of Education Science, 2008; Magana, 2017; Reynolds et al., 2016; Ross et al., 2010; Saba, 2009; Sandholtz et al., 1994; Smith, 2006; Sulla, 2011). Teachers, however, indicated technology used for communication as curriculum-driven technology. The participants were unclear as to whether the teachers were referring to email communication, which did not fit the definition in this study of curriculum-driven technology, or if the teachers were referring to academic feedback communicated through types of curriculum-driven technology.

Time saved was another idea echoed by research participants. The proximity of, and the interactions with, a curriculum-driven technology coach saved time for the teacher when learning a new curriculum-driven technology tool or when troubleshooting a curriculum-driven technology problem. Teachers mentioned their relief to not have to *stumble around* on their own when trying to use or learn curriculum-driven technology. Every research participant had access to two school-based curriculum-driven technology coaches throughout the duration of this study. Research participants cited their curriculum-driven technology coaches as sources of information on new curriculum-driven technologies and as a source of ideas for effectively integrating the technology to their lessons. Participants expressed their appreciativeness for the year-long efforts of their TTLs. Teachers felt the potential of available support from a curriculum-driven coach was almost as important as receiving actual support.

The use of instructional coaching as a means of providing long-term professional development was identified by previous researchers as an effective way to help teachers transfer knowledge from short-term professional development trainings to sustained classroom practice (Anderson et al., 2014; Desimone & Pak, 2017; Horne, 2012; Huguet et al., 2014; Sweeney & Mausbach, 2019; Walkowiak, 2016; WestEd, 2018). Participants in this study valued the support available from the curriculum-driven technology coach, whether it was troubleshooting technical problems or providing guidance on a lesson with integrated curriculum-driven technology. These findings were consistent with previous researchers' findings that indicated a strong correlation between instructional coaching and improved teacher practice (Anderson et al., 2014). One surprising finding that emerged from the teachers' responses was five of the 10 participants indicated they had not worked with a curriculum-driven technology coach but also indicated it was important to have curriculum-driven technology coaches at each school.

An important finding to emerge from the teachers' responses was the self-reported positive increase in their perceptions concerning their ability to use curriculum-driven technology after working with a curriculum-driven technology coach. When asked about their beliefs concerning their ability to use curriculum-driven technology after working with a curriculum-driven technology coach participants identified, such as more confidence and willingness to try new things. This was consistent with previous researchers who determined curriculum-driven technology coaching helped improve teacher practices by positively influencing teacher confidence levels, beliefs, and practices in using curriculum-driven technology to effect positive student learning outcomes (Barton & Dexter, 2019; Knight, 2009, 2011). Teachers reported a greater willingness to try new technologies and integrate curriculum-driven technologies into their lessons after working with a curriculum-driven technology coach.

I was surprised that of 33 participating teachers, only one teacher mentioned the impact working with a curriculum-driven coach had on teaching virtual students. Due to COVID-19, BSD leaders structured the 2020-2021 school year using a hybrid school model. BSD leaders created their hybrid model which consisted of a combination of in-person students and distance learning, or virtual, students. Parents were given the option of choosing which instructional method met their family's needs. Parents could move their student(s) back and forth between in-person and virtual as they deemed necessary. Students who became exposed to COVID-19 were mandatorily quarantined and not allowed to attend school in-person for a period of 14-21 days, depending on how the student was exposed. These students became virtual students for the time they were not allowed to attend school. BSD teachers served as either virtual teachers, in-person teachers, or a combination of the two. All in-person teachers were expected to virtually teach quarantined students for whatever length of time they were barred from physically attending school. I expected more teachers who indicated they had worked with a curriculum-driven technology coach to have referenced COVID-19 as either a motivator for coaching or a source of support for using curriculum-driven technology.

The teacher participants who reported they had not worked with a technology coach were, for the most part, either non-committal about the use and importance of curriculum-driven technology and the use of curriculum-driven technology coaches or were vaguely supportive of the coaching program. These participants, who did not work with a curriculum-driven technology coach, indicated strong negative feelings about the curriculum-driven technology coaching program and, in one case, the coaches themselves. The participants did not offer explanations about these feelings. There were examples of bias within the responses of two participants who did not personally work with a TTL but thought it was a good idea for technology-challenged teachers. Without further research, I do not know the cause of these participants' feelings or beliefs concerning curriculum-driven technology or technology coaches.

It was interesting to note every teacher in this study who worked with a curriculum-driven technology coach indicated a positive view in at least one of these areas: time saved, increased self-confidence, or the potential of curriculum-driven technology to differentiate student instruction. There was not a single participating teacher who worked with a curriculum-driven technology coach and reported dissatisfaction with the coach or the coaching relationship. Additionally, seven of the 10 teachers who did not work with a curriculum-driven technology coach recognized the benefits of the coaching program, if not for themselves then for other teachers. Curriculum-driven technology coaches positively influenced middle school teachers' perceptions of the importance of curriculum-driven technology and teachers' perceived ability to utilize curriculum-driven technology. The participants reported curriculum-driven technology coaches provided support, instruction, and access to technology, which saved time, encouraged them to try new technologies, and helped them realize the importance of utilizing curriculum-driven technology with their students.

Implications for Practice

Curriculum-driven technology coaching is a way school and district leaders can meet the requirements placed on them by government mandates to integrate curriculum-driven technology and provide curriculum-driven technology professional development (ESSA, 2015; Messer, 2015). With the multitude of duties for which principals are responsible, they have little time to devote to individualized curriculum-driven technology professional development. Based on participants' responses to the research questionnaire, curriculum-driven technology coaching programs can be used to provide consistent curriculum-driven technology professional development that is personalized to teachers' needs. Curriculum-driven technology coaches should be a source of support and instructional leadership for teachers as they integrated curriculum-driven technology to their classrooms. Curriculum-driven technology coaching programs should not be evaluative in nature and should provide time for coaches and teachers to meet. School and district leaders should develop a comprehensive and sustainable program of curriculum-driven technology coaching. The coaching program should be available to all teachers, and coaches should be housed in close proximity to the teachers.

Teachers feel more appreciated and understood because their curriculum-driven technology coaches are also classroom teachers. Because the curriculum-driven technology coaches are classroom teachers, teachers feel the information and ideas the coaches provide is valid and useful. School leaders should consider methods of scheduling that would allow classroom teachers to serve as curriculum-driven technology coaches on a part-time or half-day basis. My research findings are an indication that the use of curriculum-driven technology coaching is a worthwhile endeavor, which leads to a positive influence on teachers' beliefs about their ability to use curriculum-driven technology and the importance of using curriculum-driven technology. Curriculum-driven technology coaches play an important and necessary role in assisting teachers to integrate curriculum-driven technology to their academic lessons.

School and district leaders should use the results of this study to evaluate if the type of curriculum-driven technology professional development they provide to teachers is meeting the needs of their teachers. They should evaluate their curriculum-driven technology program to ensure adequate time and technology resources are incorporated to effectively support teachers as the integrate curriculum-driven technology. School and district leaders should use the results of this research study when developing and implementing a curriculum-driven coaching program to ensure their program aids teachers in learning, understanding, and using curriculum-driven technology.

Recommendations for Further Research

Future researchers should build upon the findings of my research study by conducting qualitative research on teachers' perceptions of curriculum-driven technology by using comparable samples of teachers from other school districts or other grade levels within BSD. Researchers should also conduct a qualitative research study that deepens this research by conducting in-depth interviews with a small group of teachers to develop a richer more descriptive representation of the participants' feelings and thoughts concerning curriculum-driven technology and working with a curriculum-driven technology coach. Future researchers should replicate this study with different grade levels of teachers, such as elementary or high school level teachers, to determine if the findings of this research study are an anomaly to middle school teachers or a representation of teachers' perceptions about curriculum-driven technology after working with a curriculum-driven technology coach.

Based on the findings in this study, I have also developed some recommendations for further research on the topic of curriculum-driven coaching and teacher perceptions about the importance of curriculum-driven technology and their ability to utilize curriculum-driven technology within their content.

1. Future researchers should specifically focus their research on why some teachers, if given a choice, would not work with a curriculum-driven technology coach. Topics to study in this proposed research should include determining if age, gender, years of teaching, or academic content area influenced a teacher's decision to work with a curriculum-driven technology coach.

2. Research should be conducted on the comparison of different types of curriculum-driven technology coaching programs used by different school districts. The comparison should include how the coaches were chosen, trained, and evaluated. Researchers should determine if one curriculum-driven technology program has a greater influence than another on teachers' perceptions of curriculum-driven technology.

3. Future researchers should develop a quantitative study to determine the effects on teacher perceptions, if any, of curriculum-driven technology coaching in different grade levels or in different sized schools.

4. Qualitative research should be conducted on the influence of curriculum-driven technology coaching on teacher perceptions of curriculum-driven technology in schools or school systems that have been utilizing curriculum-driven technology for varying lengths of time.

5. Researchers should study the influence, if any, the length of the relationship between a specific curriculum-driven technology coach and teacher has on the teacher's perceptions of their ability to utilize curriculum-driven technology and its importance in the curriculum.

6. Researchers should conduct a study comparing curriculum-driven technology coaching programs in which the coach is housed on the school campus and is a teacher as compared to curriculum-driven technology programs in which the coach is not a classroom teacher nor located in the school.

Conclusions of the Study

Within the framework of the social cognitive theory, the purpose of this research was to explore one school district's middle school teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in instructional practice after collaborating with a curriculum-driven technology coach. All the research participants who indicated they worked with a curriculum-driven technology coach reported the relationship was beneficial. Participants valued the time saved time learning how to use curriculum-driven technology by working with a curriculum-driven technology coach. Other participants valued the accessibility, understanding, and level of support provided by a curriculum-driven technology coach who was also a teacher in the building. The participants indicated they were more likely to plan lessons using curriculum-driven technologies after working with a curriculum-driven technology coach. Participants stated, after working with a curriculum-driven technology coach, their beliefs about the importance of curriculum-driven technology positively changed, and they recognized the potential of curriculum-driven technology to instruct students.

Curriculum-driven technology and curriculum-driven technology professional development are mandated and expensive requirements placed on school and district leaders. Utilizing the most effective and efficient methods of curriculum-driven technology professional development is in the best interest of school leaders, teachers, and students. Curriculum-driven technology coaches are positive influences on teachers' perceptions of curriculum-driven technology by providing encouragement and support to teachers as they develop and implement curriculum-driven technology lessons.

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Appendix A

Request for Superintendent Permission

November 13, 2020

DISTRICT INFORMATION

Mr. XXX,

As a doctoral candidate at Lincoln Memorial University, I am conducting a qualitative research study with the topic *Teacher Perceptions of Technology Integration after Working with Curriculum-driven Technology Coaches in Middle Schools in One Southeastern School District*. The purpose of this research is to explore teachers' perceptions of the importance of curriculum-driven technology and their perceived self-efficacy in using curriculum-driven technology in academic curriculum after collaborating with a curriculum-driven technology coach. I am requesting your permission to invite XXXX teachers to participate in a research questionnaire.

The research questions that will guide this study are as follows:

Research Question 1

What are middle school teachers' perceptions of the relationship between collaborating with a curriculum-driven technology coach and the teachers' beliefs or attitudes about their ability to integrate instructional technology to the curriculum?

Research Question 2

What are middle school teachers' perceptions of the relationship between collaborating with a curriculum-driven coach and the importance of integrating curriculum-driven technology to the curriculum?

The targeted population for this research study is middle school teachers of all subject areas. XXX I have chosen middle school teachers because middle school students were the first in the district to each be given a Chromebook, becoming completely one-to-one with technology, giving middle school teachers more time and opportunity than other grade band teachers to work with a curriculum-driven technology coach.

Data collection will come from an online questionnaire, which I have attached for you to view. Google Forms is the platform used to develop the questionnaire; I will email teachers eligible to participate in the study from my LMU email to their school email address to deliver the questionnaire to participating teachers. The teachers may take this questionnaire on their own time, either at school or home. The questionnaire should take approximately 20 minutes to complete. Data from the questionnaire will be analyzed for common themes. Participation is voluntary with no penalty if teachers choose not to participate, and teachers are free to withdraw at any time.

Privacy/Anonymity

- Google Forms is a secure, password protected site that the researcher will use to collect the data for this study. Participants will only be able to submit answers to the questionnaire one time, and no one other than myself or my dissertation Chair will have access to participants' responses.
- All data collected from the questionnaire will be stored in a password protected file. I and my dissertation Chair, Dr. Cherie Gaines

(Cherie.gaines@lmunet.edu), will be the only people able to access the data collected.

- All participants in the study will be assigned a coded label (e.g., T1, T2), and any identifying information regarding teachers will be redacted and not published.
- In the written report, coded labels will be used for all teachers, schools, and the school district.

Please do not hesitate to contact me with any questions or concerns you may have. If you are unable to reach me or my dissertation Chair and have general questions, concerns, or complaints about the research study, research team, or questions about your rights as a research subject, please contact the Chair of the LMU IRB, Dr. Kay Paris at XXX, or by email kay.paris@lmunet.edu.

Approval to invite XXXX teachers to participate in this qualitative research study can be granted via an email to Julie.Pepperman@lmunet.edu. I look forward to hearing from you, and I thank you in advance for your consideration.

Julie M. Pepperman

Lincoln Memorial University

Doctoral Candidate

Julie.Pepperman@lmunet.edu

Appendix B

Request for Principal Permission

November 13, 2020

Principal Name

Middle School

Principal email

Principal,

Permission has been granted by XXX, Superintendent of XXXX, for me to conduct a qualitative research study with the topic *Teacher Perceptions of Technology Integration After Working with Curriculum-Driven Technology Coaches in Middle Schools in One Southeastern School District* in partial fulfillment of the requirements for the degree of Doctor of Education at Lincoln Memorial University. I am requesting your permission to invite the middle school teachers in your school to participate in a research questionnaire. The purpose of this research is to explore teachers' perceptions of the importance of curriculum-driven technology and teachers' perceived self-efficacy in using curriculum-driven technology in academic curriculum after collaborating with a curriculum-driven technology coach. The research questions that will guide this study are as follows:

Research Question 1

What are middle school teachers' perceptions of the relationship between collaborating with a curriculum-driven technology coach and the teachers' beliefs or attitudes about their ability to integrate instructional technology to the curriculum?

Research Question 2

What are middle school teachers' perceptions of the relationship between collaborating with a curriculum-driven coach and the importance of integrating curriculum-driven technology to the curriculum?

The target population for this research study is middle school teachers of all subject areas. XXXI have chosen middle school teachers because the middle school students were the first in the district to give each have a Chromebook, becoming completely one-to-one with technology, giving the teachers more time and opportunity than other grade band teachers to work with a curriculum-driven technology coach (TTL).

Data collection will come from an online questionnaire, which I have attached for you to view. Google Forms is the platform used to develop the questionnaire; I will email teachers eligible to participate in the study from my LMU email to their school email address to deliver the questionnaire to participating teachers. The teachers may take this questionnaire on their own time, either at school or home. The questionnaire should take approximately 20 minutes to complete. Data from the questionnaire will be analyzed for common themes. Participation is voluntary with no penalty if teachers choose not to participate, and teachers are free to withdraw at any time.

Privacy/Anonymity

- Google Forms is a secure, password protected site that will collect the data for this study. The settings will reflect that participants will only be able to submit answers to the questionnaire one time, and no one other than myself or my dissertation Chair will have access to the questions or participants responses.

- All data collected from the questionnaire will be stored in a password protected file. Myself and my dissertation Chair, Dr. Cherie Gaines (Cherie.gaines@lmunet.edu), will be the only people able to access the data collected.
- All participants in the study will be assigned a coded label (e.g., T1, T2) and any identifying information regarding schools or teachers will be redacted.
- In the written report, coded labels will be used for all teachers, schools, and the school district.

Approval to invite the teachers in your school to participate in this qualitative research study may be granted through an email to Julie.Pepperman@lmunet.edu. Please do not hesitate to contact me with any questions or concerns you may have. If you are unable to reach me or my dissertation Chair and have general questions, concerns, or complaints about the research study, research team, or questions about your rights as a research subject, please contact the Chair of the LMU IRB, Dr. Kay Paris at XXX, or by email kay.paris@lmunet.edu.

I thank you in advance for your consideration

Sincerely,

Julie M. Pepperman

Julie.pepperman@lmunet.edu

Appendix C

Information and Informed Consent Statement

Teacher Perceptions of Technology Integration after Working with Curriculum-driven Technology Coaches in Middle Schools in One Southeastern School District

Information and Consent Form

As a student of the Lincoln Memorial University (LMU) Carter and Moyers School of Education EdD program, I am currently collecting data related to middle school teacher perceptions of curriculum-driven technology after working with a curriculum-driven technology coach. I am requesting your participation in my investigation. Your participation will involve completing an online questionnaire about your perceptions regarding curriculum-driven technology, which should take approximately 15-20 minutes.

Your participation in this research study is completely voluntary. You may choose not to participate or withdraw from the study at any time. Not participating or withdrawing from the study carries no penalty and will not affect your relationship or position in your school district or with LMU. If, at any time, you withdraw from the study, your responses to the survey will be discarded. Your responses will be kept strictly confidential and no personal information will be collected from the survey. All data from the questionnaire will be stored in a password protected computer file. Any paper or report related to this research will not contain your name or any other information by which you could be identified.

This study is considered a human research project; however, the risk to you for being a part of this research study is minimal. If you have questions or concerns please contact Julie M. Pepperman at PHONE or Julie.Pepperman@lmunet.edu.

This research has been approved by the Lincoln Memorial University's Institutional Review Board (IRB), XXXX, and your principal. If you have any questions about your rights as a participant in this research please contact IRB chair Dr. Kay Paris by email at kay.paris@lmunet.edu or by phone at XXX.

BY CLICKING ON THE LINK BELOW I AGREE THAT I HAVE READ THE ABOVE INFORMATION AND IMPLIED CONSENT FORM, I ATTEST THAT I AM OVER 18 YEARS OF AGE, HAVE WORKED WITH AN INTEGRATED TECHNOLOGY COACH, AND I AGREE TO PARTICIPATE IN THIS STUDY.

Appendix D

Teacher Perceptions of Technology Integration Questionnaire

Helpful terminology:

Curriculum-driven technology is the teacher's coordinated and embedded use of technology to present curriculum to students that can be tailored to individual student needs.

Curriculum-driven technology coaches are teachers who are either no longer in the classroom or teach part-time and who mentor, instruct, and assist other teachers integrate instructional technology to their curriculum. An example of a curriculum-driven technology coach in this school district would be a Technology Teacher Leaders (TTL).

1. Beginning in July of the 2019–2020 school year through the fall of the 2020–2021 school year, did you work with a curriculum-driven technology coach (Teacher Technology Leader [TTL]), and if so, on average how often? (This includes group and individual professional development, watching instructional technology being modeled, communicating questions or ideas, participating in online or in person training, etc.)

   ____ 1-2 times a month

   ____ 3 or more times a month

   ____ 2 or more times a week

   ____ I did not work with an instructional technology coach.

2. Please rate: After working with a curriculum-driven technology coach (TTL), I believe that curriculum-driven technology (i.e., computers, laptops, iPads, tablets, educational software) is an important instructional aid in all academic content areas.

___ Strongly Agree

___ Agree

___ Disagree

___ Strongly Disagree

3. Please rate: It is important to me to have a curriculum-driven technology coach at my school.

   ___ Strongly Agree

   ___ Agree

   ___ Disagree

   ___ Strongly Disagree

4. Please expand upon your answer to the previous question.
5. Has working with a curriculum-driven technology coach (TTL) influenced your beliefs about your ability to use curriculum-driven technology, and if so, how?
6. Has working with a curriculum-driven technology coach influenced your perceptions concerning the importance of including curriculum-driven technology in your teaching practices, and if so, how (e.g., using instructional technology for differentiated instruction, lesson planning, remediation)?
7. Has working with a curriculum-driven technology coach impacted your perceptions of the importance of curriculum-driven technology in student assessment (formative and summative), and if so, how?

8. Has working with a curriculum-driven technology coach affected your opinion about the use of curriculum-driven technology in your classroom? If so, how?
9. Has working with a curriculum-driven technology coach helped you participate in individual professional development, school-wide initiatives, or district wide initiatives that promote teacher professional growth? If so, how?
10. Has a curriculum-driven technology coach (TTL) impacted your perceptions of the importance of teachers gaining curriculum-driven technology skills? If so, how?