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Examining K-12 Principals' Leadership Role and their Beliefs Toward Technology Integration in the 21st Century Classroom

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EXAMINING K-12 PRINCIPALS' LEADERSHIP ROLE AND THEIR BELIEFS TOWARD TECHNOLOGY INTEGRATION IN THE 21st CENTURY CLASSROOM

by Rhonda Michelle Robinson

This dissertation has been read and approved as fulfilling the partial requirement for the Degree of Doctor of Education in Curriculum and Leadership.

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DEDICATION

"To whom much is given, much is required."

Long ago, a seed was planted that led me to pursue a degree in education. I was taught that education is a valuable gift that will provide me with so many opportunities in life. I dedicate this dissertation to my parents, Charlie and Julia Robinson, and my late grandparents.

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ABSTRACT

Educational experts have evolved substantially over the past several decades in their thinking about educational leadership and the critical role that principals play in supporting the teaching and learning environment within schools through their leadership behaviors. Although educational leaders have had a significant impact on the field of education to integrate technology effectively with the goal of increasing student achievement and overall school performance, most of the research on technology integration has been teacher-focused, rather than on principals' preparation, skill, knowledge, and related leadership. Continuation of teacher-focused research, though beneficial, has left a research gap concerning the skills and preparation that are needed by principals to become digital instructional leaders. Using a causal comparative quantitative research design, this study included eight K-12 principals and 20 teachers from elementary, middle, and high schools conveniently sampled from each of the schools in the selected district. The study measured K-12 principals' and teachers' knowledge of Teacher Digital Age Learning and Instructional Leader Digital Age Learning. The data were collected using a web-based survey and analyzed utilizing a series of independent samples *t*-tests. The results indicated that there was not a statistically significant difference in school principals' and teachers' perceptions of Teacher Digital Age Learning. Further, a statistically significant difference did not exist between the principals' and teachers' perceptions of Instructional Leader Digital Age Learning. The study's findings could provide useful data for the district's leadership development program to cultivate strategies that could assist principals in their acquisition of knowledge and skills regarding technology in schools.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Technology has completely revolutionized both the societal and educational landscape. Infused into entertainment, business, the workforce and educational environments, technology increasingly has become a daily part of our everyday lives (Harris, 2016). The past century has yielded meaningful changes to the teaching and learning process, which has led to the reexamination of the model of teaching and the typology of the classroom (del Campo, Negro, & Núñez, 2012). Historically, teachers have served as the primary source of knowledge, and passive pupils have learned from textbooks. The reality is that advancements in education are not about replacing teachers; however, teacher-centered pedagogical practices no longer adequately prepare students to be productive citizens in the digital age (Fisher & Waller, 2013). The past decade has succumbed to the demands of a modern workforce shift, necessitating the need for students to develop skills that allow them to "communicate, collaborate, think critically, and solve the types of problems that impact them directly and globally" (Fisher & Waller, 2013, p. 2).

Background of the Problem

Educational Reform Efforts

Several comprehensive educational reform movements that encompass federal- and state-imposed educational reform initiatives, such as standards-aligned, academically rigorous curricula, high-stakes assessment programs, increased emphasis on accountability and performativity, and technology infiltration, have contributed

significantly to the added demands that have been placed on U.S. schools. Inherently, federal and state policies have sought to hold principals accountable for the academic success of their students (Day, Gu, & Sammons, 2016; Finney, 2011).

Enacted in 2002, the No Child Left Behind (NCLB) Act put in place measures that exposed academic achievement gaps among traditionally underserved students, spurring national dialogues on education improvement. Arguably, the NCLB Act has been one of the most significant educational reform policies of the 21st century (Husband & Hunt, 2015). Many works has been written about its effect on the educational sector. Husband and Hunt (2015) examined empirical literature on the effects of the NCLB Act on students, teachers, school curriculum, and administrators. In Husband and Hunt's empirical examination of administrators' perceptions of the NCLB Act, administrators viewed components of the Act positively and negatively. Some studies revealed an appreciation among administrators toward the high expectations of standards and expressed a belief that the accountability measures led to increased student achievement and encouraged an evaluation of achievement gaps. Conversely, administrators felt frustrations with the punitive sanctions toward progress.

Husband and Hunt (2015) examined other researchers' studies of how the implementation of the NCLB Act affected the practices of principals. Studies indicated that, in response to the NCLB Act, principals changed their practices in several key components to include data analysis to align instruction with assessment goals. Moreover, administrators also reported a greater involvement in instructional decisions and increased efforts at instructional leadership.

Husband and Hunt's (2015) pursuit of examining the empirical literature on the effects of the NCLB Act within the field of education yielded a broad range of findings and implications for future research. Pointing to some of the existing gaps in the research, while the NCLB Act seems to have encouraged an increased use of technology within classroom instruction, teachers reported a lack of adequate training in effective use of technology. A small number of studies (e.g., Eaton, 2005; Lowther, Inan, Sthrol, & Ross, 2008) examined the effectiveness of technology reform initiatives (as cited in Husband & Hunt, 2015, p. 236). Future research could include deeper explorations of administrators' perspectives and practices that have been the most successful in increasing student achievement.

With the emphasis on narrowing the achievement gap between groups of students who are identified as at-risk for failure or low achievement in U.S. schools through the NCLB Act, the Obama administration's Race to the Top (RT3) and, most recently, the Every Student Succeeds Act of 2015 renewed the attention on school leaders and overall school improvement. Today, principals are increasingly held accountable for the academic success of their students (Vogel, 2018; Williams & Welsh, 2017). Wise integration of evolving technology demands a rethinking of principal leadership and pedagogical practices.

Principal as Technology Leader

As education links the ever-changing field of technology and the market forces digital globalization, principals are faced with the challenge to lead schools that adequately prepare skilled and creative citizens who are ready to meet the demands of the 21st century (Thannimalai & Raman, 2018). To be effective in schools and classrooms,

teachers and administrators need training, tools, and proficiency in 21st century skills, which will strengthen their instructional and leadership capacities (Vockley & Partnership for 21st Century Skills, 2016). As the challenges of the 21st century have prompted a call for cultivating 21st century educational systems, the unwavering culture of comprehensive reform over the past decades irrevocably has changed how the role of the principal is conceptualized. Fullan (2003) and the Technology Standards for School Administrators Collaborative (TSSA Collaborative, 2001), a group of educational organizations from across the United States, determined that the individual with the most direct influence on teachers was the building principal. Consequently, as technology becomes an agent of change in school reform movements, the advancement and success of such a change is dependent upon the support of the leadership that is most closely connected to those individuals who need to change (as cited in Kozloski, 2006, p. 5).

Thannimalai and Raman (2018) conducted a quantitative study exploring the influence of secondary principals' technology leadership and professional development on teachers' technology integration. Two different questionnaires were used for principals and teachers. Principals were administered an instrument based on five constructs of the National Education Technology Standards - Administrator (2009), namely *visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement,* and *digital citizenship.* While the study proved that there was a significant relationship between principals' technology leadership and teachers' technology integration, recommendations for future research suggested an approach to obtain more concrete findings on the relationship between principals' technology leadership and teachers' technology integration.

Vogel's (2018) qualitative study surveyed 50 practicing principals to explore what elements of their educational leader responsibilities aligned with their instructional leadership roles and what experiences these principals identified as helpful in preparing them to assume the role of school instructional leader to include the use of technology to support student learning. Interestingly, technology use or implementation was not mentioned by any of the principals in the study as part of their responsibilities as instructional leaders. Participant responses in the area of technology used to support student learning was a finding in the study that merits consideration, as 21% of the principals reported little or no preparation.

As with all research, each finding often opens several more avenues for exploration. Vogel's (2018) study warrants future research regarding the use of technology to support student learning. Machado and Chung (2015) suggested more research was needed on the role of the principal and the effect that principals have on technology integration because they are responsible for organizing and enforcing the school vision and plan. To fully understand the impact of principal leadership for technology integration, Kozloski (2006) suggested research on the teachers' perceptions of principals as instructional leaders.

Teacher Technology Integration

The integration of technology into teachers' classroom practices is influenced greatly and is correlated closely to their attitudes towards educational technologies (Celep & Tülübaş, 2014). Previous research has recognized the importance of teachers' beliefs and their instructional strategies (Ertmer, Ottenbreit-Leftwich, & Tondeur, 2014). Ertmer

et al. (2014) further asserted that using technology to support 21st century teaching and learning could be supported by best practice.

Within the field of educational technology, teacher practices have been identified as either traditionalist or constructivist. Teachers with constructivist beliefs utilize technology in more challenging ways by creating environments, which deepen students' understandings through higher-level thinking skills; whereas, traditionalists tend to implement more teacher-centered learning environments or "low level" uses of technology (Ertmer et al., 2014). Ertmer et al. (2014) further asserted the last 30 years have yielded a persistent call for more constructivist uses of technology, as studies have found that teachers with more constructivist beliefs tend to utilize technology more often and in more challenging ways.

The literature has suggested that a change in teachers' technology practices necessitates a change in the underlying beliefs that support and facilitate those practices. In Alghamdi and Prestridge's (2015) study of principals' and teachers' beliefs about technology use, they explored teachers' beliefs of integrating learning technologies in the classroom. The results of the study noted an alignment between principals' and teachers' beliefs regarding the use of technology in teaching and learning. Principals who have a clear vision for achieving pedagogical conditions for technology change, could guide the use of technology to enhance the school learning environment. This finding supported Baylor and Ritchie (2002), who suggested that, if teachers perceived that administrators value and promote the use of technology, technology could be more widely valued and integrated in the classroom. Alghamdi and Prestridge (2015) recognized the study's

limitations, suggesting a more in-depth investigation of principals' and teachers' beliefs using a mixed methods research design.

Educational Technology and Technology Integration

The topic of technology can be puzzling, and, perhaps, the most confounding piece of the puzzle is reaching a definition of *technology* that works to foster healthy discussions of how schools can use technology to enhance teaching and learning (Levinson, 2013). The 2014 National Assessment of Educational Progress framework correlated the definition of technology to human desires and behaviors. The framework defines *technology literacy* as "the capacity to use, understand, and evaluate technology as well as to understand technological principles and strategies needed to develop solutions and achieve goals" (p. 5). Recognizing the global diversity of technology, Stosic (2015) asserted that no singular term can be used to define educational technology. The researcher described the term as a "systematic and organized process of applying modern technology to improve the quality of education" (p. 111).

Since the mid-19th century, the classroom has become home to a succession of technologies (e.g., textbook, chalkboard, radio, film, and television) that have been tailored to the dimensions of classroom practice (Cuban, 1986). Technology has been suggested by reformers as a way to revolutionize classroom instruction by increasing productivity.

Brooks-Young defined *technology integration* as "the process of assimilating technology into the school curriculum in a manner that is pedagogically sound" (as cited in Gallogray, 2015, p. 32). The National Center for Education Statistics (2002) offered a broader depiction of technology integration. Curriculum integration with the use of

technology involves the infusion of technology as a tool to enhance the learning in a content area or multidisciplinary setting.

> Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyze and synthesize the information, and present it professionally. The technology should become an integral part of how the classroom functions—as accessible as all other classroom tools. (National Center for Education Statistics, 2002, para. 21)

In today's world, big technological trends (e.g., personalized learning, blended learning, and 1-to-1 computing) have emerged over time, making technology integration commonplace in both society and education (Esplin, 2017; Herold, 2016). Personalized learning lent technologies as powerful tools to help schools meet the needs of ever-more-diverse student populations. The idea was that digital devices, software, and learning platforms offered an array of options for tailoring education to each individual student's academic strengths and weaknesses, interests and motivations, personal preferences, and optimal pace of learning (Herold, 2016). In its simplest terms, blended learning combined traditional, teacher-to-student lessons with technology-based instruction. Increasingly, schools moved to provide students with their technology learning devices. Schools purchased more than 23 million devices for classroom use in 2013 and 2014 alone. In recent years, iPads and Chromebooks have emerged as the devices of choice for many schools (Herold, 2016).

The Unprecedented Shift to Digital-Age Learning Cultures

In the wake of the COVID-19 global pandemic that has affected most parts of the world profoundly, a paradigm shift in terms of learning worldwide now exists. Most

educational institutions around the world are moving away from the traditional face-to-face classroom to digital learning (Mulenga & Marbán, 2020). Amidst all of his transformation, federal and state governing agencies along with district governance boards and district leaders had to re-evaluate digital learning. Subsequently, instructional leaders had to focus on integrating technology into their leadership processes (Mulenga & Marbán, 2020).

With this sudden shift away from the classroom in many parts of the globe, some governmental and educational leaders are conjecturing how such a shift could impact the worldwide education market. Roache, Rowe-Holder, and Muschette (2020) explored leadership skills needed to assist learners' transitioning to online learning in higher education institutions. In response to the global COVID-19 pandemic, educational institutions have been forced to continue educational offerings through online mediums (Roache et al., 2020). Leadership of this transformation requires skilled leadership to lead educational organizations through this change. Roache et al. (2020) offered several considerations for moving courses fully online, including policies and planning, financial management, designing and delivering lessons, student support services, and students' engagement.

Statement of the Problem

The U.S. Department of Education (2010) warranted "schools must be more than information factories; they must be incubators of exploration and invention. Educators should be more than information experts; they should be collaborators in learning, seeking new knowledge and constantly acquiring new skills alongside their students" (p. 1). With so many demands of technology, a deeper understanding of learning, and the

advent of differentiated instruction, more teachers should adjust their pedagogical approach depending on their students' learning needs (Covili, 2016). Putting technology in the classroom gives teachers the tools of the 21st century; however, the attempt to integrate technologies could be fruitless without proper integration. Successful technology integration is more than just getting the tools into the classroom. When technology integration is seamless and thoughtful, classroom dynamics could change. Students become more engaged and take control over their own learning (Edutopia, 2007).

The literature has supported that technology use has been a topic of discussion among researchers and educators for several years. The problem is that, in spite of these significant endeavors, less research exists on the extent of principals' beliefs about technology use as an integral part of K-12 education and how their leadership role could influence pedagogical conditions and student outcomes positively (Alghamdi & Prestridge, 2015). Principals and teachers could link a deeper level of collaboration and cooperation to leverage technology for learning effectively. To propel well-rounded, productive citizens in an ever-changing, global society, administrators and teachers could work together on the common goal of preparing students for the future. Importantly, if principals do not place a value on technology in the classroom, an integral piece of the puzzle is missing (Machodo & Chung, 2015).

Purpose of the Study

To support technology use, the school principal could develop a vision of how school reform could be influenced by technology use. The development of this vision requires that the school principal understands the potential benefits of technology use in teaching and learning (Alghamdi & Prestridge, 2015). As instructional leaders, principals should possess the knowledge and disposition to be able to lead teachers in developing 21st century classrooms and instructional practices (Arrington, 2014). This study consisted of a quantitative, non-experimental research, utilizing a causal-comparative research design. The purpose of this study was to determine if differences existed between principals' and teachers' perceptions of instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. For this study, the independent variable was group with two levels (i.e., K-12 principals and teachers). The two dependent variables were K-12 principals' and teachers' knowledge of Teacher Digital Age Learning and Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

Research Questions and Hypotheses

The overarching research question that guided this study was: What is the difference between K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration? The researcher examined principals' and teachers' knowledge of Teacher Digital Age Learning and Instructional Leader Digital Age Learning as measured by the *21st Century*

Instructional Leadership Inventory. The supporting research questions and hypotheses on which this study was based were as follows:

1) What is the difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory?*

H_o: There is not a statistically significant difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

H_a: There is a statistically significant difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

2) What is the difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory?*

H_o: There is not a statistically significant difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

H_a: There is a statistically significant difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

Conceptual Framework

Within the context of research, Imenda (2014) describes the framework as the *soul* of the research project. Specifically, the research framework serves as the compass,

which guides researchers in explaining and interpreting the occurrences of their research study. Imenda expanded that a conceptual framework connects a number of related concepts to provide a broader understanding of the research problem (p. 189).

Principal leadership served as the core concept of this research study. Fullan's (2014) *Three Keys of Leadership*, leading the learning, being a district and system player, and becoming a change agent, was the conceptual framework that served as the lens for examining school principal leadership. Fullan contended that principals' leadership practices should encompass leading teachers in the process of learning while learning alongside them. Further, Fullan stressed the importance of school principals not working in isolation and looking beyond their walls to cultivate relationships with other school leaders. In addition, the school principal should be the catalyst for enacting change. All three broad concepts collectively form the conceptual framework on the importance of the principal's role as the instructional leader, further as the change leader, to cultivate 21st century classrooms and instructional practices and quintessentially leading teachers in the progression of student learning.

Methodology Overview

Research Design

According to Kravitz (2016), causal-comparative research attempts to identify a cause-effect relationship between two or more groups. This quantitative study was designed to examine the knowledge of principal leaders about 21st century classroom structures and instructional practices and, specifically, to answer if are there differences between principals' and teachers' perceived knowledge of instructional leadership

behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration.

This study used an adapted form of Arrington's (2014) *21st Century District Level Instructional Leadership Inventory* to gather principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to develop 21st century classrooms and instructional practices, which support technology integration. Additional demographic data for position, teacher content area, gender, administrative and teaching experience, educational experience, educational level, and number of years since the participant had taken a postsecondary, technology-related course were gathered with the survey instrument.

Definition of variables. The current study was a quantitative research project, which examined the relationship between two or more variables; therefore, a causal-comparative research design was used. For this study, group assignment (i.e., K-12 principal or teacher) was defined as the independent variable, and *21st Century Instructional Leadership Inventory* survey responses for the elements of Teacher Digital Age Learning and Instructional Leader Digital Age Learning were defined as the dependent variables.

Survey Instrument and Procedures

Arrington's (2014) instrument was designed to identify what district instructional leaders knew and what they needed to do in order to lead teachers in creating 21st century classrooms within their schools. The survey consisted of 76 questions using a Likert-type five-point rating scale, three open-ended questions, and six demographic questions, which were asked via an online survey system. Arrington's future research recommended

suggested conducting research with building level administrators, which would allow for a broader analysis of those leaders that directly lead teachers in developing 21st century classrooms. To gather principals' and teachers' perceptions of instructional leadership behaviors and 21st century knowledge and skills, the researcher utilized four dimensions of Arrington's instrument, which included 1) It is Important that School Instructional Leaders, 2) As a School-level Instructional Leader dimension, 3) Importance of Teaching Students 21st Century Skills dimension, and 4) Assess Your Knowledge of 21st Century Skills dimension. For the purpose of this study, the researcher referenced the adapted research instrument as the *21st Century Instructional Leadership Inventory* (Appendix A).

Thirty-nine questions using a Likert-type five-point rating scale and nine demographic questions were asked via an online survey system. For Dimension 1 (It is Important that School Instructional Leaders) and for Dimension 2 (As a School Instructional Leader), the response options included *Strongly Disagree, Disagree, Undecided, Agree,* and *Strongly Agree*. Dimension 1 consisted of eight questions, and Dimension 2 consisted of nine questions. Dimension 3 (Importance of Teaching Students 21st Century Skills), the response options included *Unimportant, Of Little Importance, Moderately Important, Important,* and *Very Important*. For Dimension 4 (Assess Your Knowledge of 21st Century Skills), the response options included *Very Limited or No Knowledge, Limited Knowledge Level, Moderate Knowledge Level, High Knowledge Level,* and *Very High Knowledge* or *Expert*. Dimension 3 consisted of 12 questions while Dimension 4 consisted of 10 questions (Arrington, 2014).

Analysis of Data

For this study, K-12 principals and teachers were surveyed to examine their knowledge of 21st century skills. Using the Statistical Package for Social Sciences (SPSS) version 23, participants' responses were analyzed via a series of independent samples *t*-test to determine if their perceptions differed significantly based on 21st century knowledge and skills as characterized by the four dimensions in the *21st Century Instructional Leadership Inventory*.

Delimitations and Limitations

Delimitations

The primary delimitation of this study was that the researcher chose to narrow the scope of the study, which was confined to surveying school principals and teachers in a single organization for public education that served K-12 students.

Limitations

This research study was subject to several limitations. Unexamined factors affecting progress toward integrating instructional technology into the curriculum that were not accounted for in the study may exist. Additionally, the data collection format of an electronic survey may yield limited participation. The survey instrument was delivered to all participants in same format, without an option for a paper and pencil survey.

The chosen research design for the study also posed limitations. Although causal-comparative research is effective in establishing relationships between variables, there are many limitations to this type of research. Because causal-comparative research occurs *ex post facto*, researchers have no control over the independent variables and thus cannot manipulate them. In addition, often, variables other than the independent variable(s)

could impact the dependent variable(s); hence, the researcher could not be certain that the independent variable caused the changes in the dependent variable. The inability to construct random samples was another limitation in causal-comparative research. Without random assignment, the results could not be generalized to the population, and the researcher's results were limited to the targeted sample that was included in the research study (Salkind, 2010).

Oddly, the timing of the study also posed limitations. In response to the spread of the coronavirus (COVID-19) pandemic, governors and legislatures called for the statewide closure of public schools, “forcing a near-total shutdown of school buildings in the spring of 2020, a historic upheaval of K-12 schooling in the United States” (Education Week, 2020, para. 1). The shelter-in place orders forced districts that relied on face-to-face interactions to shift quickly to remote learning. This rapid shift stifled the morale of both teachers and students and thrust educators to learn new technologies to decrease the digital divide (Kurtz, 2020). As such, the participants’ reactions to the pandemic could have impacted their survey responses.

Unprecedented times posed another research limitation. To keep employees and students safe as possible, the district adapted teaching, learning, and operations, which included revising the guidelines to conduct research during the 2020-2021 school year. As part of the approval process, the district Research Authorization Committee imposed conditions to include a permitted subgroup of elementary, middle, and high schools where the research could be conducted.

Definition of Terms

For the purpose of this study, the following terms were defined:

21st century skills – "students capacity to apply knowledge and skills in key subject areas and to analyze, reason, and communicate effectively as they raise, solve, and interpret problems in a variety of situations" (as cited by Ertmer et al., 2014, p. 404).

21st century classroom – "rigor, criticality, innovation, integration of digital tools into all facets of the curriculum, and preparation for informed civic participation" (Price-Dennis & Matthews, 2017, p. 97).

Digital citizenship – "more than educating students about online risks; helping students leverage the power of digital media to engage ethically to (re-)create a more equitable world" (Buchholz, DeHart, & Moorman, 2020; ISTE, 2020).

Digital-age leadership – *"*educational leaders visibly using and discussing technology tools that best meet students' needs, preparing them to be globally competitive citizens in the 21st century" (Larson, Miller, & Ribble, 2010, p. 15).

Digital-age learning – Digital Learning Now and the Florida Virtual School defined digital learning as "learning facilitated by technology that fosters a culture where learning is not restricted by time, within the walls of the classroom, teacher pedagogy, and the learning pace of the entire classroom" (as cited by the Governor's Office of Student Achievement, 2020, para. 1-4).

Educational technology – *"*a systematic and organized process of applying modern technology to improve the quality of education" (Stosic, 2015, p. 111).

Instructional leadership –

> … is the collaborative process between principals, teachers, and other stakeholders who serve to (1) define the school's mission, (2) promote a positive school learning climate, and (3) manage the instructional program through (a) the development of curriculum, instruction, and assessment; (b) the use of data to guide instruction; (c) the use of technology to support instruction; and (d) feedback through the supervision and evaluation of teaching process. (Vogel, 2018, p. 3)

Leadership – "an entity providing personal influence and communication directed toward the attainment of a goal or multiple goals" (Arrington, 2014, p. 7).

Principal – "the person who serves as administrative head of a school, and who is responsible for the coordination and direction of all school activities" (Georgia Department of Education, 2016, p. 2).

Professional capital – "function of the interaction of three components: human capital (human resources), social capital (interactions and relationships among people), and decisional capital (that which is required to make good decisions)" (Fullan, 2014, p. 99).

Teacher of record – "any GaPSC [Georgia Professional Standards Commission] certificate holding educator, who is responsible for a specified portion of a student's learning activities that are within a subject/course and are aligned to performance measures" (Georgia Department of Education, 2016, p. 2).

Technology enhanced learning environments – "complex learning that enable appropriate use of technological resources in order to continually enhance the conditions conducive to learning" (Brown & Jacobsen, 2016, p. 812).

Technology leader – "enables others to effectively and successfully use, manage, assess, and understand technologies of the designed world" (Celep & Tülübaş, 2014, p. 248).

Technology integration – seamlessly infusing technology into pedagogical practices to enhance student learning. "The incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools" (Lawless & Pellegrino, 2007, p. 577).

Significance of the Study

"Our students have changed radically. Today's students are no longer the people our educational system was designed to teach" (Prensky, 2001, p. 1). Inevitably, students are immersed in a society fruitful of digital tools. Driven by a global trend of digital progression, our world has changed, as have the learners who schools are responsible for educating. Understanding the shifts that have permeated both societal and educational landscape is key to developing a teaching and learning culture that best meets the needs of our students.

Leadership is a key component in guiding the teaching and learning processes necessary for preparing today's students with the knowledge and skills that are necessary in today's society to become a productive citizen of the 21st century. For the sustainable integration of technology necessary for the engagement and success of 21st century digital natives, school administrators and teachers should acknowledge the technology

paradigm shift that is needed to transform 21st century instructional practices utilizing technology (Ugur & Koc, 2019).

With a core purpose of student learning and improving student achievement, district and school leaders invest a plethora of time in strategically planning reform initiatives to increase student learning outcomes and close academic achievement gaps. Acknowledging that today's students are *wired* differently, educational leaders are increasingly recognizing students' abilities to succeed in a 21st century work environment that requires a different set of 21st century skills that nurture critical thinking, communication, creativity, and collaboration; hence, school administrators are faced with increasing pressure to enhance student learning. Consequently, "it is important for administrators and teachers to work together on the common goal of preparing our youth for the future" (Machado & Chung, 2015, p. 43).

Decades of research exist on leadership styles, linking the role of the principal as a change agent to school improvement. In addition, a glaring amount of research exists on technology integration. Despite the significant impact of technology and the acknowledgement of the principal as a key facilitator in promoting educational change, a deficiency still exists in the literature that addresses instructional leadership behaviors and its relative effectiveness in leading and developing 21st century classrooms and practices, which support technology integration (Ulrick, 2016). How can we possibly meet the needs of today's unique learners if our practices are suited for a time that has long since passed? This study was a needed addition to the current research on technology leadership.

Investigating the belief structures of both principals and teachers is needed to guide extant efforts of technology integration. The practical significance of this study was to bridge the gap of examining principals' technology leadership role and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. Traditionally, educational reform efforts have an increased focus on teacher professional development. In an era of accountability reform efforts, amongst showing a relationship of teachers to student achievement, principals have an increased responsibility in leading school improvement reform. Many of these leaders may not have had the necessary preparation to meet the demands of increasing student achievement, which is entailed in an approach to transform instructional practices and student learning via technology implementation. Professionally, although the data were gathered from only one K-12 district, the information generated could provide useful data for school district's leadership development programs to cultivate strategies that assist principals in their acquisition of knowledge and skills regarding technology in schools (Kozsolski, 2006).

The political significance of this study derived from the existence of the rewrite of Every Student Succeeds Act. Under this Act, funding decisions for schools have shifted to state and districts. With this shift in funding, districts have the autonomy to design instructional programs based on student needs (Rentner, Kober, & Frizzell, 2017). As such, information presented in this study could guide educational leaders in their investment of technology innovations for teachers and students. Recognizing that today's learners are "wired" differently as a result of experimental learning that occurs outside the walls of the school, characteristics of today's learners conflict with traditional

teaching styles and preferences (Sheninger, 2019). Leaders need to be aware of the changing educational landscape, which includes advances in educational technology. Acknowledging and understanding these changes are the first steps to developing a vision and strategic plan for creating a learning culture that provides access to tools that support innovation.

The personal significance of this study was two-fold. First, as a teacher, media specialist, and instructional administrator for over 10 years, the researcher understood the importance of instructional effectiveness to improve student learning outcomes. Intrinsically, the researcher understood the importance of school leadership as a vital factor in fostering a culture of leading the learning in schools. Second, as a current district technology leader, the researcher understood that district leadership could serve as a deterrent or an impetus to the linkage of leader actions to improvement in student learning. Collegial teams at the district and school level collaborating with one another on school improvement initiatives, such as technology implementation, could potentially produce stronger outcomes.

Summary

Chapter I introduced the research problem, studies that have investigated the problem to date, deficiencies in existing studies, the importance of the study, and the study design. Next, background of the problem was discussed, the research questions were stated, the methodology was described, the definition of terms was listed, and the delimitations and limitations of the study were outlined. Finally, the significance of the study was explained. Chapter II is a comprehensive review of the literature in the areas of

educational change, educational leadership, and educational technology with the central theme of principal leadership for technology integration.

CHAPTER II

REVIEW OF LITERATURE

The emergence of global education has put a premium on student learning. Since the 20th century, the *winds of change* have swept the U.S. educational landscape (Carper, 2001). An outgrowth of trends, such as accountability systems, transforming teachers' pedagogical practices from traditional to more constructivists, and the infusion of technology into classrooms, have taken hold of the educational pipeline and have forced district- and school-level educational leaders to reexamine organizational structures and cultures (Watts, 2009). Change is an inevitable dynamic of life. Leadership for deep transformational sustainability denotes a new and expanded understanding of leadership, necessitating a different type of leadership skill that requires a deeper layer of change around the role of the principal (Arrington, 2014; Doyle, 2018).

As the role of the principal has evolved over time, increased pressure for accountability and leading innovation has changed how the role of the principal is perceived. The modern day principalship is no longer the *lead teacher* who taught and managed one-room schoolhouses two centuries ago. The role encompasses a large array of responsibilities in the areas of building manager and instructional leadership (Humada-Ludeke, 2013; Reagan, 2015).

Leadership is a key determinant in guiding the teaching and learning processes that are needed for preparing today's students with the 21st century knowledge and skills that are necessary to become a productive citizen in today's society. In order to embrace this concept as a conduit for a formidable 21st century education, school leaders are

charged in leading school reform efforts that include cultivating technology-enhanced learning environments, which nurture deep learning (Fox & McDermott, 2015).

In the last decade, researchers have conducted a great deal of research on 21st century education and technology integration and its impact on teaching and learning. Fox and McDermott (2015) conducted qualitative case studies on how educators and school systems engaged school adults and students in 21st century education. Focusing on two regional districts, these researchers found that, while many traditional tenets were still in place, several indications of engaging students in 21st century skills environments that encompassed critical thinking, technology proficiency, project-based, or student-centered learning were present. Future research indicated a need for district and school leaders to have a clearer understanding of 21st century skills influence on student learning. Hsu (2016) used a mixed methods approach (i.e., surveys as well as interviews and observations) to examine teachers' current beliefs, practices, and barriers concerning technology integration. The study found that teachers who held constructivist pedagogical beliefs about technology integration had higher self-efficacy beliefs about technology use. Through a qualitative investigation, Schrum and Levin (2013) highlighted approaches that *exemplary schools* used professional development to achieve their goals of focusing on 21st century skills for engagement and achievement. While professional development has been identified as an essential component in changing teachers' practices, well-articulated goals and a clear vision for technology integration are vital for sustaining changes in practice.

Relevant literature has concurred that technology integration is a critical factor of a 21st century education and that teachers are critical components in enacting educational

change. Moreover, findings suggested the need to focus more on the role of school leaders. Research by Cruickshank (2017) referenced that there has been considerable research about how classroom and school conditions influence student learning; however, less research expanded to include a focus on how principals could influence those conditions positively.

As technology enhancement in schools is a fundamental change that depends greatly on building-level leadership, this change facet deserves special attention (Watts, 2009). To have a deeper understanding of the impact of principal leadership on technology integration, the researcher sought to examine K-12 principals' leadership role and their beliefs toward technology integration in the 21st century classroom.

The researcher's review of literature included books, journal articles, studies, and professional literature to address the topic of the knowledge that is needed by school principals to lead schools and by teachers in integrating technology in 21st century classrooms. Four sections frame the literature review. The first section provides a historical overview of the evolution of the role of the principal as a leader, specifically, the impact of technology on school leadership. The second section provides a discussion that defines technology leadership in terms of Fullan's (2014) *Three Keys to Maximizing Impact* as a conceptual overview of principal leadership that connects broadly to the organizational context of the study. The third section addresses principals' perceptions of technology integration based upon student learning outcomes, pedagogical practices, and the 21st century learner and examines teachers' perceptions of technology leadership. The summary concludes the review of literature. Table 1 provides a concept analysis for the reviewed studies that are related to the literature review introduction.

Table 1

Concept Analysis Chart: Literature Review Introduction

STUDY	PURPOSE	PARTICIPANTS	DESIGN/ANALYSIS	OUTCOMES
Fox and McDermott (2015)	Investigated how school systems and educators engaged students and adults in 21st century education.	Four schools in two regional districts	Qualitative: Used a case study framework to ascertain the instruction, organization, governance, and accountability systems in each school.	• The results indicated that the schools with developing constructivist characteristics promoted 21st century skills; however, traditional components of student learning and teacher pedagogy were still in place.
Hsu (2016)	Examined the current beliefs, practices, and barriers concerning technology integration.	K-6 teachers in midwestern United States	Mixed-methods: Online surveys, interviews, and observations. Data were coded and transcribed, and cross-case analyses identified patterns.	• Teachers who held constructivist pedagogical beliefs placed positive value on technology use. • Lack of computer skills, lack of technical support, lack of training, and time were identified as technology barriers.
Schrum and Levin (2013)	Presented lessons that were learned about successful professional development for promoting technology integration.	eight secondary schools	Qualitative: Data collected through interviews and focus groups. Data were analyzed using constant comparative analysis method.	• Data led to a deep understanding of how schools implement professional development to achieve goals of focusing on 21st century skills for student engagement and achievement. • Leadership practiced the principles of distributed leadership. • Purposeful reconfiguration of the curriculum was a result of professional development.

Grounding the Conceptual Framework of Principal Leadership

Educational experts have evolved substantially over the past several decades in their thinking about educational leadership and the critical role that principals play in supporting the teaching and learning environment within schools through their leadership behaviors (Gurley et al., 2015). While the established tone of an individual school is a synthesis of perceptions among administration and teachers, the vision of teaching and learning is that of the school principal. Despite the research and literature that are prevalent in examining teachers and technology integration, limited research exists to establish the existence of a relationship between effective school leaders and increased technology integration in the classroom by teachers (Gallogray, 2015). Likewise, while school leaders are critical to implementing change in schools, a dearth of research exists in the literature that addresses the existence of a relationship between principals' and teachers' perceptions of leadership effectiveness with regard to technology integration, hence, summarizes the basis of the conceptual framework for this study.

Although educational leaders have had a significant impact on the field of education to integrate technology effectively with the goal of increasing student achievement and overall school performance, effective leaders should keep abreast and adapt to changing technologies to lead an organization towards accepting and implementing that change (Courville, 2011). "While there are many different theories on leadership in general, one specific theoretical framework continually presents itself within the literature dealing with technology leadership. Because of the focus on innovation and the adaption of new technology, technology leadership is often viewed within the theoretical framework of change leadership" (Courville, 2011, p. 5).

Researchers and theorists posit that many varying definitions of how and why a change in behavior occurs. Cuban (1998) has devoted a significant amount of his academic writings viewing change leadership. In his analysis of effective school reform, Cuban asserted that schools change reforms as much as reforms change schools. He identified three common criteria that are used by policymaking elites (i.e., effectiveness, popularity, and fidelity) and two less common ones that are used by practitioners (i.e., adaptability and longevity) and applied them to the two decades of school reform. "What emerged as crucial in evaluating school reforms is what criteria are being used to make judgments, whose criteria they are, and how schools change reforms as they are implemented" (Cuban, 1998, p. 453).

Looking through the lens of Fullan (1991) regarding the complexity of implementing school-wide change, Schrum, Galizio, and Ledesma (2011) sought to explore preparation and requirements of new administrators with respect to the integration of technology. To provide a comparative context, the researchers sought to explore the precise licensure preparation and requirements of new administrators, as well as to understand the perspectives of experienced tech-savvy administrators regarding how they learned what they know and how they lead their schools in the 21st century.

The research team gathered information from all 50 U.S. states through web investigations of departments of education documents and analyzed the states' requirements for building administrators. In addition, the researchers collected programs of study information from 137 educational leadership programs to identify whether or not a technology course was offered. Findings revealed 48 of the 50 U.S. states did not require their future school leaders to demonstrate knowledge of technology use, and only

a minority of prospective leaders may have received coursework to assist them regarding the thoughtful integration of technology into instructional practice to enhance student learning. However, as a contrast to the states' requirements and their leadership preparation, a purposeful sample of self-identified technology-using administrators perceived that they learned on their own and did see the use and support of technology as being important to their ability to lead schools effectively (Schrum et al., 2011).

Recognizing the field of technology as being in a state of constant innovation and accepting the premise that technology leadership is essentially leading through consistent change, Courville (2011) suggested that one can look to the academic works of leadership advocate and change theorist, Michael Fullan. Courville recognized that "Fullan has devoted a significant amount of his academic writing to developing leaders who can effectively adapt to change and promote their organizational goals within a changing environment" (p. 5). Fullan (2001) recommends that in order for leaders to be effective they must "understand the change process" (p. 5) and further defines the change process as one where a leader should first develop a reasonable implementation process aligned with the leader's goals. Fullan's (2014) *Three Keys of Leadership* was the conceptual framework that served as the lens for looking at school leadership. Fullan identified three keys to maximizing the principal's impact, which includes leading the learning, being a district and system player, and becoming a change agent. Figure 1 provides a visual representation of this study's conceptual framework.

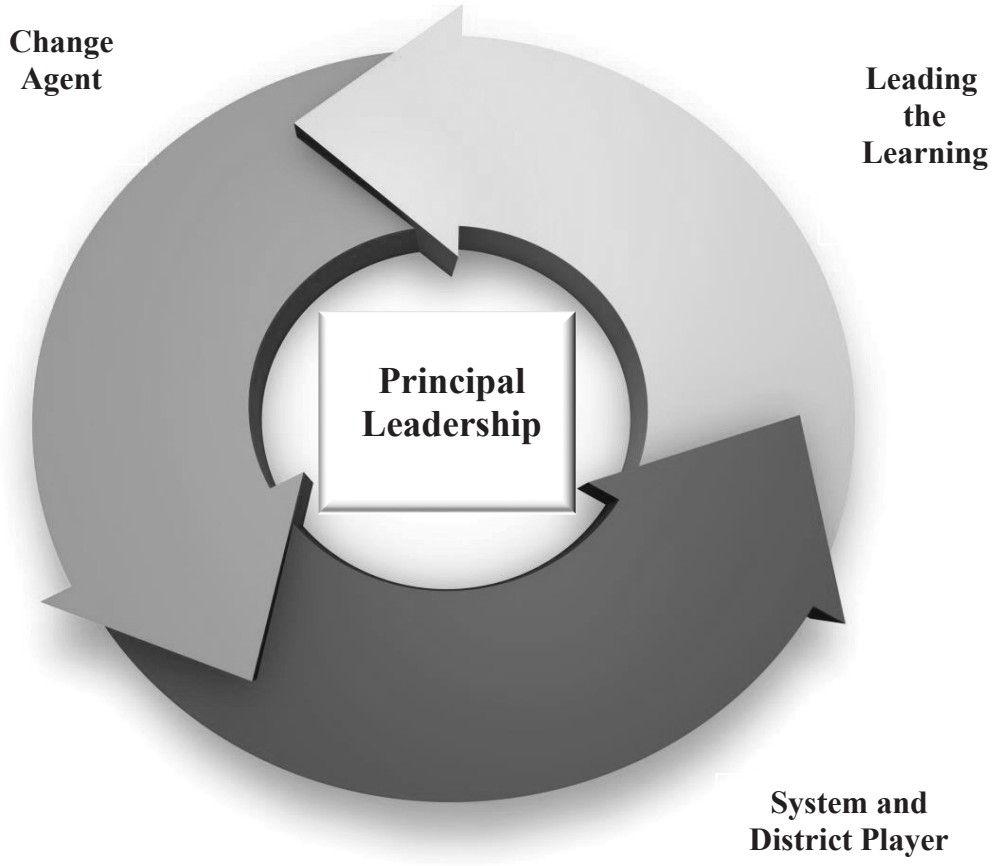

Figure 1. Fullan's *Three Keys of Leadership*. *Note.* Text for conceptual framework from Fullan, M. (2014) and image adapted from Costa, L. (2016).

Leading the Learning

The principal is instrumental to the process of teachers' integration of technology into their pedagogical practices. According to Baylor and Ritchie (2002), administrators lend credibility to a technology culture when they encourage the use of technology, not only in words but also in action. Fullan (2014) posits that the principal's role is to lead the school's teachers in the process of learning in order to move the organization forward in a continuous process of improvement. To maximize impact, principals must utilize their time in a manner that propels collective efficacy.

While the literature is rife on the role of the principal as it affects student learning, Fullan (2014) surveyed key research findings into what effective principals do that yield results in leading learning. Robinson and her colleagues (2011, as cited in Fullan, 2014) conducted a large-scale research on the impact of school principals on student achievement. Robinson and her colleagues found five leadership domains that had significant effect sizes on student achievement, which included establishing goals and expectations (.42), resourcing strategically (.31), ensuring quality teaching (.42), ensuring an orderly and safe environment (.27), and being leading teacher learning and development (.84). Each category outlined specific practices, but the underlying message was quite distinct and supported Fullan's (2014) theory of the role of a learning leader. Robinson et al. (2011, as cited in Fullan, 2014) found that the principal who makes the biggest impact on learning is the one who "participates as a learner" with teachers in helping move the school forward. Other authors and their colleagues conducted parallel studies examining the relationship between teacher learning and student achievement. Their findings were consistent; principals affect student learning indirectly but nonetheless explicitly (Fullan, 2014).

Being a District and System Player

Fullan (2014) contends that in order to improve the school, the principal should look beyond the walls of the organization. Principals should use a concerted effort to use all resources, including those resources that are outside the school, to build the *professional capital* of teachers so that student learning can flourish. Thus, principals need to become *system players*, which are school leaders who look beyond their own reality by having a broad view of the entire system. As system players, school leaders

“contribute to and benefit from the increased performance of other schools in the district and of the system as a whole” (Fullan, 2014, p. 68).

To provide a relevant understanding of being a district and system player, Fullan (2014) expounded upon cultivating “whole system change” (i.e., how all schools in a province, state, or country improve). Innovations and implementations that only affect a few schools produce fragmented change. Fullan contended that raising the bar and closing the achievement gap for students mean large-scale improvement, as small-scale reforms do not work. Focusing on the three core components of deep learning (i.e., learning and teaching, change knowledge, and the culture of learning) yield greater results in a reasonably short period of time.

Fullan (2014) referenced the research conducted by Ken Leithwood on the characteristics of high-performing districts. In Leithwood's study (2011, as cited in Fullan, 2014), he contended that leaders should cultivate relationships with other schools and leaders, so they can have a better understanding of their own school environments. Leithwood further asserted that as principals seeks ideas from similar schools and districts with comparable success, they become more informed about their own practice. In their study of leadership and student achievement, Leithwood and Louis (as cited in Fullan, 2014) found that almost 60% of principals who were surveyed indicated that their districts only occasionally provided them with opportunities to work productively with colleagues from other schools.

To support his argument that leaders have failed to use the lateral resources in the system to leverage greater success, Fullan (2014) referenced the examination of a report by the Office for Standards in Education (2013, as cited by Fullan, 2014) that examined

progress over the past 20 years in the seven of the most deprived areas in England. The report concluded that schools that did not show improvement experienced several forms of "disconnection" to include poor relationships within the school, communities, and schools' isolation from other schools. While schools with similar demographics existed, the persistently unsuccessful schools worked alone and did not reap the benefit of success from the sharing of ideas and innovative practices (Office of Standards in Education, 2013, as cited in Fullan, 2014).

In sum, to maximize impact, the principal should seek ideas from other similar schools that perhaps have had more success and see herself or himself as a system player. When the ideas of thousands of principals are unleashed and shared, resources surge. When principals look beyond their walls to improve within, they establish a bigger, collegial platform to maximize their impacts (Fullan, 2014).

Change Agent

Effective principals should be able to facilitate change even in the face of challenging circumstances. Fullan (2014) describes this facilitation as "acting sooner than later but always alert to feedback" (p. 123). Fullan cites the work of Lyle Kirtman (2013, as cited by Fullan, 2014) and the skills for leading change. These skills include challenging the status quo, building trust through clear communication and expectations, creating a commonly owned plan for success, focusing on team over self, having a sense of urgency for sustainable results, committing to continuous improvement for self, and building external networks and partnerships. Fullan (2014) further explained that these competencies are the building blocks for professional capital and that the interdependence of learning and managing is most critical for principals to master.

Leading the learning, being a district and system player, and becoming a change agent are essential to leadership in today's schools. Technology leaders should pace themselves and the implementation of technology within their organization (Fullan, 2001). Fullan (2001) further asserted an actual increasingly clear notion of the nature of the paradigm shift that is underway in radically altering the nature of learning through technology, especially in non-rote instructional settings requiring learners to construct knowledge and meaning in order to achieve deep understanding. Fullan (2018) contends that the "principalship" has changed in gradual ways over the past five years and is about to land in a new place. The more powerful technology becomes, the more indispensable good teachers are. Table 2 provides a concept analysis for the reviewed studies that are related to the conceptual framework.

Table 2

Concept Analysis Chart: Conceptual Framework

STUDY	PURPOSE	PARTICIPANTS	DESIGN/ ANALYSIS	OUTCOMES
Schrum et al. (2011)	Investigated the status of administrator preparation programs in providing the leadership necessary to facilitate technology use and understand the perspectives of administrators leading their schools in the 21st century.	Principals, assistant principals, superintendents, and central office administrators	Data were analyzed with simple description and thematic coding for trends.	Data gathered in this study suggested that individual states were not demanding that their current or future administrators have expertise in understanding or promoting the instructional uses of technology.

Historical Perspective of the School Principal

Over the course of the past century, many organizational changes have taken place in public education; however, few changes have had greater impact than the development of the school principal. The conception of the school principal revolutionized the internal organization of the school from a single classroom of students who were supervised by one teacher to a collection of teachers who are managed by one administrator (Rousmaniere, 2007).

The memory of the "little red schoolhouse" paints the picture of one-room schools as iconic emblems of the rural past in the United States. With 91% of the U.S. population living in dispersed farm communities, the schools were the building blocks for rural communities (Beisaw & Baxter, 2017). The first schools in the United States had unregulated operations with no standard educational processes or administrative procedures and offered only elementary education in single or dual room schools with no attendance requirements, no common curriculum, and no standard practices. Presented with multi-aged classrooms and no curriculum, teachers based their instruction on basic reading and mathematical literacy relying on rote memory or primal sources, such as McGuffey Readers, and, often, students progressed at their own pace. Trailing the American Revolution through the mid-19th century, many students attended elementary school, and fewer advanced their studies in grammar or high school. Females were deterred from advancing their education, and education was even less accessible for African American children (Rousmaniere, 2013).

Prior to the creation of state and local school systems, schools in the United States followed a simple hierarchy. Community school boards or trustees fulfilled the roles of

parent association, personnel office, as well as the hiring supervisor who evaluated teachers and served as the overseer of the children. Teachers were not chosen for their academic qualifications but more for their moral character and community affiliations. From the colonial period through much of the 19th century, teachers worked alone under broad administrative directives, carrying the weight of the entire school on their shoulders (Rousmaniere, 2013). The early teachers not only instructed students, but they also served as building keeper and disciplinarian.

Emergence of the Principal as a Leader

The principal teacher. The first principal's positions emerged in the mid-19th century to address urban districts' demands of new graded schools. Students were classified by age and achievement and placed in separate classrooms under the guidance of a single teacher. The head teacher, or teaching principal, assumed some of the duties teachers previously held. As the *building administrator*, the principal teacher was the overarching authority, organizing the courses of study and rendering discipline to students. By the late 19th century, most urban schools in the United States and Canada had graded elementary and secondary schools with some form of a building administrator who reported directly to a district officer (Rousmaniere, 2007).

The work of the 19th century principal began as routine administrator, with little focus on the improvement of learning. With no systematic process, these early administrators worked almost unrestricted of job descriptions, legal guidelines, and professional support (Rousmaniere, 2007).

As delegations of duty grew, the principal's role formalized. The late 19th century urban populations and local school enrollments flourished, leading urban school

superintendents in Boston, Chicago, Cincinnati, and New York City to delegate responsibilities to building-level individuals (Regan, 2015) who were authorized with "coordinating the work of the various departments and securing continuity of materials and progress through the various grades" (Pierce, 1935, p. 11). As the second half of the 19th century waned, the principal's role was relieved steadfastly of teaching duties, and the modern day principal emerged as an administrative presence charged with managing the school, establishing the curriculum, evaluating and monitoring teachers' pedagogical techniques, and other instructional and organizational duties (Brown, 2005).

The beginning school principal. By the end of the 19th century, principals were relieved from their unskilled head teachers' duties, and the principal teacher became a shadowy figure on the educational landscape. The early 20th century sparked the realignment of the principal's role away from the classroom (Rousmaniere, 2007). Rousmaniere (2007) described two steps toward professionalizing the role of the principal. The first step was to distinguish between administrative tasks and supervisory responsibilities. The growing demand of principals to manage growing staff led to their removal as teacher leaders. As Kafka (2009) described, during the 1920s, the role grew into the modern school principal. Not only did principal responsibilities include managerial, instructional, and community tasks, principals were expected to lead and instruct teachers, monitor students, and be a community leader. By the mid-1930s, 70% of urban principals in the United States had no teaching responsibilities. The second step towards professionalizing the role of the principal was strengthening academic qualifications. As Kafka (2009) documented, professional associations encouraged states to pass laws requiring greater principal certification requirements. Once perceived as

teachers with additional responsibilities, school principalship came to be noted as a prestigious profession. By the 1950s, one-third of all U.S. states and half of Canadian provinces stipulated academic requirements for school principalship (Rousmaniere, 2007). Principals became to be viewed as notable individuals in school reform efforts. "For many observers at the time, the principal *was* the school" (Kafka, 2009, p. 324).

Recent scholars have noted that the rise of the modern principal did not happen in a historic vacuum. As principals worked to sustain their prestige and authority, schools increasingly replaced the church as the center of socialization in society. Between 1870 and 1898, school enrollment doubled from 7 million to 15 million, and, by the turn of the century, 71% of youth between the ages of 5 and 18 were enrolled in some form of schooling, averaging 5 years of attendance. By 1940, compulsory education attendance laws in the United States increased the expectancy for youth to attend school, and, with local officials more regularly enforcing these laws, nearly 80% of youth between the ages of 14 and 17 attended some high school, with more than 50% becoming high school graduates. As more youth attended school, education became an important part of family life, and principals and teachers increasingly became prominent figures in the community (Kafka, 2009).

The rise of the modern principal. According to Kafka (2009), "several nonhistorians have taken up the task of placing the 20th century history of the school principal in broad context, primarily by focusing on how large historic shifts have been reflected in expectations of the school principal" (p. 325). Authors, Lynn Beck and Joseph Murphy (1993), used metamorphic themes and patterns that were discovered in people's language to describe the changing roles of the principal across several decades

based on the evidence found in educational literature from the period. In the 1930s, for example, the dominant theme for the principal's role was efficiency, while, in the 1960s, the major emphasis was conflict. The dominant theme in the 1970s was negotiation, while, in the 1980s, the dominant theme characterized the principal as a change agent.

Using Beck and Murphy's (1993) organizational frame for understanding the history of schooling and applying it to the role of the principal, several other scholars have followed their portrayal to frame their own depictions of the principalship. Through a similar lens, Dr. Phillip Hallinger, recognized as an innovator in leadership development, approached the evolution of the principalship in the light of developments in national and state education policy. In his article about the evolving role of U.S. principals, Hallinger (1992) analyzed three roles that emerged in the United States from the 1960s to the 1980s, which included the program manager, instructional leader, and transformational leader. He argued that, in the 1960s and 1970s, principals were expected to manage federally-sponsored entitlement programs (i.e., special and bilingual education) and curricular reforms. Hallinger maintained that "as a result of increased federal intervention in local policy, principals came to be seen as potential change agents" (p. 2).

In the early 1980s, reports of public school failure fueled heightened concerns for increasing student achievement. In this light, research that focused on measures of student achievement became particularly noticeable for policymakers. Dwindling monies that were available to many state and national economies propelled accountability to become a driving force for resource allocations to education. As reform efforts gained momentum, government agencies at all levels sought to manipulate student outcomes

through educational restructuring (i.e., charter schools and school-based management). Affirming the principal's capacity to enact change, principal evaluation measures increased from a mere nine states to over 40 states, and principal in-service trainings increased globally. While disagreement concerning the belief that principals affect the lives of teachers and students was minimal, the nature and degree of their influence fueled open debates (Hallinger & Heck, 1996).

Knowing the complexity of principal effectiveness, researchers increased their attention to this issue. Believing that an updated review was warranted, Hallinger and Heck (1996) reviewed empirical research from 1980 to 1995, which examined the role of principal leadership in school effectiveness. In their quest, the researchers focused on the conceptual foundation of several theoretical models to study the effectiveness of the principal role, framing a possible research agenda for future studies on school administration.

Hallinger and Heck (1996) identified 40 studies that explored the relationship between principal leadership behavior and school effectiveness. Both qualitative and quantitative analyses were used in several studies. Most studies that were identified in the search used a cross-sectional, correlational design in which the investigators used surveys or interviews as their methods for data collection. In the conceptual analysis of their study, the Hallinger and Heck adapted Pitner's (1988) models for viewing the principal's role in school effectiveness (Hallinger & Heck, 1996). Pitner's (1988) models "offer a comprehensive set of different perspectives for viewing the effects of the school context on administrative behavior and the influence of administrative behavior on the school and its outcomes" (Tomlinson, 2013, p. 219).

When the studies were grouped in terms of theoretical models, the studies supported the notion that principal leadership made a difference in student learning; however, future research was recommended to explore the facets under which this effect was achieved (i.e., socioeconomic environment, school culture, and instructional organization). In addition, principal leadership that made a difference was aimed toward influencing internal processes (e.g., teacher practices, student learning opportunities, and school mission) that were directly linked to student learning (Hallinger & Heck, 1996). While the studies did not link leadership to student achievement directly, Hallinger and Heck (1996) concluded that the principal's role could not be diminished and that "understanding the routes by which principals can improve school outcomes through working with others is itself a worthy goal for research" (p. 39). Table 3 provides a concept analysis for the reviewed studies that are related to the history of the principal's role.

Table 3

Concept Analysis Chart: History of The Principal's Role

STUDY	PURPOSE	PARTICIPANTS	DESIGN/ANALYSIS	OUTCOMES
Hallinger and Heck (1996)	Reviewed empirical literature on the relationship between the principal's role and school effectiveness.	40 studies that explored principal behavior and effectiveness	Case Study Selection-Quantitative: Presented a conceptual for classifying non-experimental studies of principals' effects. The studies were analyzed in terms of their theoretical models.	Principal leadership that made a difference influenced internal processes that were linked directly to student learning.

Leadership Styles and Instructional Effectiveness

The "focus on the development of instructional leadership skills for school principals in the United States continues to be at the forefront of educational research and reform in response to the increased call for accountability" (Gurley et al., 2015, p. 127). In their study, Gurley and colleagues (2015) reviewed relevant literature regarding instructional leadership from a historical perspective and presented a conceptual framework of instructional leadership in the 21st century. The quantitative study examined the instructional leadership behaviors of a small cluster of principals ($n = 9$) who recently had matriculated to positions as head principals in their school district. Prior to their appointment as school principals, each leader had attended an assistant principals' academy, which was designed in partnership between a southeastern U.S. school district and university educational leadership faculty to enhance and deepen assistant principal instructional leadership skills. A comparison of principal self-reports to teacher perceptions of instructional leadership behaviors suggested that principals and their teachers agreed more closely regarding principal behaviors in managing the instructional program, but greater variability existed in principal leadership behaviors focused on defining and communicating the school's mission.

The Roots of Instructional Leadership

The roots of instructional leadership began during the 1960s and 1970s. Although efforts were made during the 1960s to identify factors contributing to student learning, conversations regarding the role of the principal as an instructional leader were not highly regarded in conversation. Instead, researchers tended to focus on the relation between capital resources (i.e., funding) and measure of school outcomes (i.e., standardized test

scores). The Coleman Report, published in the mid-1960s, reported that "variations in the facilities and curriculum of the schools account for relatively little variation in pupil achievement insofar as this is measured by standard tests" (Coleman, 1966, p. 21). Factors, such as students' family backgrounds and teacher verbal skills, contributed to student success; however, instructional leadership was not addressed (Gurley et al., 2015).

Coleman and his colleagues'(1966) release of *Equality of Educational Opportunity*, a 737-page report to Congress, was dense with charts, tables, and complex analyses of the disparities between White and Black students in public schools, and the effects of that inequity on academic achievement. Fifty years later, Sparks (2016) revisited the report and provided a graphical analysis at what the Coleman Report (1966) had to say about the key education issues, which included school segregation, testing, academic mindset, college enrollment, and teachers.

Since the Coleman Report, the National Assessment of Education Progress has seen steady progress and persistent achievement gaps among young people nationwide. While Coleman and his colleagues (1966) found deep divisions between Black and White students in how much they believed their own effort could make a difference in their academic achievement and later success in life, building academic mindsets became centerpieces of many turnaround school models. More students from all racial backgrounds attended college more than ever before, and teacher quality looked different than the teaching profession looked in 1966. While Coleman found teachers' verbal ability and educational background to be most predictive factors on student learning, later

research affirmed that teacher experience and content knowledge were related to good teaching.

In the 1970s, a new line of research emerged. This decade brought a new perspective to the conversation that centered on school effectiveness and laid the foundation for examining the influence of the school principal on the learning environment. As researchers studied the process of change reform, their writings reflected the important role that principals play in school improvement (Gurley et al. 2015).

The Emerging Role of Instructional Leadership

A plethora of studies developed during the 1980s, which explored the role of the school principal, instructional leadership, and change agency. One noteworthy study by Clark, Lotto, and McCarthy (1980) claimed that the action of principals was a critical factor in determining student success in that principals who initiated and implemented programs and policies that centered on student learning influenced the behaviors of school personnel.

For decades, educational literature has examined the gap between student achievement and socio-economic status in low achieving schools. Many researchers have presented discouraging statistics noting that students from diverse backgrounds and adverse conditions (i.e., poverty, low parental involvement, and urbanism) achieved less than students with opposite conditions. Despite well-documented testimony on low student achievement, others have discovered that many administrators and teachers are demonstrating the ability to rouse zest for learning in students (Clark et al., 1980).

The research of Clark et al. (1980) suggested the need for a general outlook that encompasses multiple variables. In their case study analysis of more than 1,200 studies on factors that were related to success in urban schools, they identified a number of dimensions, including *strong leadership* that positively affected the school's culture. The researchers correlated leaders and their behaviors to school success. The researchers generalized that effective instructional leaders understood the bits and pieces of effective pedagogy and found ways to ensure that all students in their schools experienced quality instruction.

The Rise of Transformational Leadership

In the 1990s, instructional leadership shifted to a new leadership style, transformational leadership. In Robinson, Lloyd, and Rowe (2008), the origin of transformational leadership was noted to come from Burns (1978) in which he analyzed the ability of leaders across various organizations. According to Burns, *transforming leaders* are moral examples of working towards the benefit of the team, organization, and/or community. Robinson et al.'s (2008) study additionally noted that Bass and colleagues (1994), who developed survey instruments to assess transformational leadership, extended Burns's (1978) theory further. "Variations of these instruments have been used in many published empirical studies of transformational leadership in education, though few have investigated the impact of such leadership on students' academic or social outcomes" (Robinson et al., 2008, p. 639).

Robinson et al. (2008) conducted a study to examine the relative impact of different types of leadership on students' academic and nonacademic outcomes. Rather than conducting an analysis of the overall impact of leadership on student outcomes, the

focus was on identifying the relative impact of different types of leadership. The methodology for the study involved a dual meta-analysis of findings from 22 of 27 published studies, which involved a comparison of the effects of transformational and instructional leadership on student outcomes.

Findings from the first analysis indicated that the average effect of instructional leadership on student outcomes was three to four times that of transformational leadership. Additionally, the surveys used to measure school leadership revealed that five sets of leadership practices were used to measure leadership, which included establishing goals and expectations; resourcing strategically; planning, coordinating, and evaluating teaching and the curriculum; promoting and participating in teacher learning and development; and ensuring an orderly and supportive environment. The comparisons between transformational and instructional leadership and between the five leadership dimensions recommended that the more leaders focused their relationships, their work, and their learning on the core business of teaching and learning, the greater their influence on student outcomes (Robinson et al., 2008). Table 4 provides a concept analysis for the reviewed studies that are related to principal leadership styles.

Table 4

Concept Analysis Chart: Principal Leadership Styles

STUDY	PURPOSE	PARTICIPANTS	DESIGN/ANALYSIS	OUTCOMES
Clark et al. (1980)	Correlated leaders and their behaviors to school success.	97 case studies in the final sample and leading researchers and writers on urban education	Meta-analysis: Case studies were aggregated to find repetitive findings and conclusions. Interview data were aggregated descriptively.	• Effective instructional leaders understood the bits and pieces of effective pedagogy and found ways to ensure that all students in their school experienced quality instruction.
Gurley et al. (2015)	Explored how teachers in their schools perceived principals' instructional leadership behaviors and compare them to principals' self-perceptions.	Small cluster of nine principals who had attended an assistant principals' academy	Quantitative	• No significant differences between principal and teacher ratings of instructional leadership behaviors were found.
Robinson et al. (2008)	Examined the relative impact of different types of leadership styles on students' academic and nonacademic outcomes.	27 published studies	Meta-analysis: Comparative approach of analyzing the impact of different types of leadership styles	• Findings suggested that the more leaders focused on the core business of teaching and learning, the greater their influence on student outcomes.

Leadership and Technology for School Improvement

The 21st century propelled scholars to study and write on a variety of leadership models that made a difference for student learning. Models that included instructional leadership, transformational, transactional, collaborative, distributed, and teacher leadership captured the attention of scholars, but, recently, educational researchers and policymakers have begun to redirect their attention to principal leadership. Accountability policies, such as the NCLB Act and RT3, enacted during the 21st century that required more comprehensive systems of principal and teacher evaluations and raised expectations in terms of performance standards for educators (Humada-Ludeke, 2013).

Educational Reform and Principal Leadership

With the changes of educational reform, several studies have explored the changing expectations of principals. To highlight the concern surrounding the changing environment of educational reform, Alvoid and Black (2014) stated, “These changing expectations, couple with insufficient training and support, have led many principals to the conclusion that the job is no longer sustainable” (p. 2). Additionally, Alvoid and Black reported that *New Leaders*, a nonprofit organization that develops educational leaders, found in 2012 that 20% of new principals left their positions within two years. After studying 180 schools in nine states, researchers from the University of Minnesota and the University of Toronto concluded, “We have not found a single case of a school improving its student achievement record in the absence of talented leadership” (Miller, 2015, p. 2). These reports revealed that expectations and the importance of meeting the challenges and concerns were inherent for principals today.

Historically, educational reform efforts have focused on teacher professional development. In an era of reform that centered on accountability, instructional leadership, and student achievement, principals are charged increasingly in leading school improvement efforts. Research increasingly has correlated the role of the school principal and student achievement, second to the role of the teacher (Humada-Ludeke, 2013).

Ulrick (2016) asserted that years of empirical literature on various leadership styles shows that "effective school leadership is the degree of influence or synergy between teachers and principals around the core business of schools, instruction" (p. 157). While various leadership styles, such as transformational and instructional, indicate similar organizational qualities, the changeability of how these styles connect overcasts how principals systematically improve schools (Ulrick, 2016). A principal's leadership influences student outcomes in different ways through both instructional and non-instructional tasks. The degree to which principal leadership influences student outcomes depends on the overall school environment as well as particular behaviors of the principal, teacher, student, and community (Urick, 2016).

Urick's (2016) study sought to demonstrate the ways in which the simultaneous practice of leadership styles helped to determine different levels of shared instructional leadership. The study sampled a national representative of U.S. principals. Further, this study sought to understand the underlying theory behind why principals may practice some leadership tasks and influence over others. Urick used a theoretical framework of needs categories to help explain how these leadership styles could work together.

Based on the theoretical framework, principals should have a similar high influence over resources, safety, and facilities regardless of the degree of shared instructional leadership. The study's findings, however, revealed that principal and teacher influence over these resources differed across levels of shared instructional leadership more than principal-directed tasks of facilitating a mission, supervising instruction, and building community (Ulrick, 2016).

Technology Educational Reform

The past two decades have been marked by comprehensive federal education reforms aimed at closing the achievement gap among minority students and improving academic outcomes in the nation's lowest performing schools. Reform efforts, such as the NCLB Act, RT3, and the Elementary and Secondary Act, have increased accountability of districts and schools by setting rigorous achievement targets, implementing high stakes testing, and incorporating incentives and sanctions as a mean for school improvement. In some states, these efforts ushered in sweeping legislative changes joining teacher evaluations to student performance and establishing steeper consequences for persistently failing schools. Despite these reform efforts, districts and schools have experienced mixed results in student outcomes (Mania-Singer, 2017).

The limited success of school reform efforts have served as a catalyst for researchers to examine how change may be achieved in schools for the purpose of improving teaching practices and increasing student achievement. These findings have served to influence the progression of technology in educational reform. Advancements in technology and productivity over the last decade demand new ways of integrating current and future technological innovations into public education. Many states have

explored the role that technology has in the classroom and how educators could incorporate technology in ways that engage and excite 21st century learners. As technology has become an increasingly invaluable tool in today's classrooms, state and federal legislatures have and are designing policies to fund and support its use in schools (National Conference of State Legislatures, 2017).

State and school reform. To provide a catalyst for improvement in the teaching and learning process, the state of Georgia invested millions of dollars in support of its belief that providing educational technology for classrooms offered effective ways to improve schools and to help students learn. In 2000, the state board of education in Georgia instituted the Georgia Framework for Integrating TECHnology (InTech), which was a 50-hour training program that prepared teachers to integrate technology successfully and help their students accomplish technology standards and performance objectives. While the state-sponsored initiative was enacted for school improvement, decisions for the ongoing commitment were made without empirical support (Sheumaker, Minor, Fowler, Price, & Zahner, 2001).

To address the specific need for research examining the influences of InTech and the most effective ways to implement changes that were necessary for integrating technology into the curriculum, Sheumaker et al. (2001) and Johnson (2006) conducted research studies investigating the influences of InTech. The goal of Johnson's quantitative study was to investigate a sample of K-12 teachers' self-efficacy, technology integration, and current instructional practices after completing the InTech training program. Information was gathered via the Level of Technology Integration instrument and addendum questionnaire, the Computer Self-Efficacy instrument, and

semi-structured observations and interviews. The results indicated that teachers' perceptions of the quality of InTech training and personal computer use contributed significantly to teachers' computer self-efficacy; however, current instructional practice was not statistically significant.

In 1999, BellSouth Foundation launched an initiative to address the central role of ensuring education reform in the South. BellSouth edu.pwr3, a multi-year, multi-million initiative was designed to increase the capacity of school leaders, teachers and students. The initiative consisted of three components, which included Power to Lead, Power to Teach, and the Power to Learn. The overarching goals of the initiative were to provide leadership support to school superintendents with technology deployment strategies, provide teacher professional teacher development grants, and expand learning for students (Bellsouth Foundation, 2003).

Quantitative and qualitative data from surveys, site visits, and direct communications revealed encouraging results. At the culmination of the program in 2002, nearly 71% of elementary teachers and 75% of secondary teachers reported high levels of technology integration in their classes. A deeper examination of the data showed vast differences between students' and teachers' perceptions of instructional technology practices. While teachers perceived that they made great strides in their ability to harness the power of technology to create stimulating, engaging and challenging learning experiences for students, the students themselves remarked few changes in classroom instruction as they longed for more opportunities to use technology in challenging and meaningful ways (Bellsouth Foundation, 2003).

Federal reform. RT3 marked a historic moment in U.S. education. The initiative offered bold incentives to states who were willing to spur systemic reform to improve teaching and learning in schools. One of the core components of the reform effort was the adoption of better data systems to provide schools, teachers, and parents with information about student progress. RT3 states like Georgia successfully integrated multiple data systems to provide a range of tailored resources and information for different audiences (e.g., teachers, students, and parents). Some states used their funds to begin the transformation of classrooms into 21st century environments.

The Every Student Succeeds Act included an increased focus on technology-related requirements to achieve educational outcomes and opportunities for all students. The reform contained significant provisions that impacted how federal dollars were spent to support education technology and digital learning, including specific professional development and training for teachers, principals, and school leaders regarding how to use the technology in the classroom effectively. While the Every Student Succeeds Act did not include a specific education technology program, the Act provided provisions on how federal dollars were spent. Districts that chose to spend federal funds on education technology invested in a wide range of initiatives. Blended learning programs and student device initiatives, referred to as 1:1, became widely present. As leaders embraced the vision to personalize the student learning experience and create opportunities for students to become agents of their learning, technology integration created a classroom paradigm shift, molding classrooms from being primarily teacher-directed learning environments to predominately student-centered, technology-enhanced learning environments that promote collaboration, communication, creativity, and critical thinking.

Technology became a powerful tool for transforming learning. It helped affirm and advance relationships between educators and students, reinvented approaches to learning and collaboration, shrank long-standing equity and accessibility gaps, and adapted learning experiences to meet the needs of all learners. To realize the full benefits of technology in our education system and provide authentic learning experiences, educators need to use technology effectively in their practice (Office of Educational Technology, 2010). Table 5 provides a concept analysis for the reviewed studies that are related to technology state and school reform.

Table 5

Concept Analysis Chart: Technology State and School Reform

STUDY	PURPOSE	PARTICIPANTS	DESIGN/ ANALYSIS	OUTCOMES
Johnson (2006)	Investigated a sample of K-12 teachers' self-efficacy, technology integration, and current instructional practices after completing the InTech training program.	elementary, middle, and high school teachers	Quantitative: Correlation, multiple regression, ANOVA, and chi-square statistical methods and content analyses.	Teachers' perceptions of the quality of InTech training and personal computer use contributed significantly to teachers' computer self-efficacy; however, current instructional practice was not statistically significant.

School Leadership, Student Learning, and Technology for the 21st Century

Significance of Technology Integration

As education has evolved, conventional classroom needs are different in the modern day classroom. The Partnership for 21st Century Skills noted that technology has

a fundamental role in creating a 21st century education system. Creating a 21st century education is about making sure that students are prepared to compete in an ever-changing competitive, global society via robust educational systems, which support innovative teaching and learning (Vockley & Partnership for 21st Century Skills, 2007). In order to embrace these concepts as a conduit for a formidable 21st century education (Fox & McDermott, 2015), teachers should develop new teaching strategies that are different from those strategies that are employed in traditional classrooms (Cakir, 2012). In multiple works, Levin and Schrum (2013, 2014) noted among the reasons that were needed to change "education as usual" is that today's students learn in different ways and have different experiences with technology. The current generation of students, *digital natives*, spend a massive amount of time interacting with newer technologies (Lewis, 2016). Technology integration could mold classrooms from being primarily teacher-directed learning environments to predominately student-centered, technology-enhanced learning environments (Shepard & Brown, 2014), which promote collaboration, communication, creativity, and critical thinking.

Teachers in the 21st century are facing new challenges because of the expanding possibilities of technology integration (Albion, Tondeur, Forkosh-Baruch, & Peeraer, 2015). As cited by Hsu (2016), ISTE, the Partnership for 21st Century Skills, and the State Educational Technology Directors Association called for a need to provide training to develop teachers' abilities to teach 21st century skills with technology. In an effort to improve teaching and learning, school districts are investing a vast amount of monies in classroom technologies (Bell O'Leary, 2014); however, in many buildings, dust covers

the many technological tools that were meant to enhance student learning (Potter & Rockinson-Szapkiw, 2012).

Efforts to train teachers on how to use new technologies have often been short-sighted and have grazed the surface of meeting teachers' needs to support technology that is fully embedded in classroom instructional practices (Potter & Rockinson-Szapkiw, 2012). Despite being provided technology hardware, software, and some training, many teachers do not integrate technology effectively because they have not progressed beyond using technology for their own productivity and creating teaching materials (Harris, 2016). To be effective in schools and classrooms, teachers and administrators need training, tools, and proficiency in 21st century skills that will strengthen their instructional and leadership capacities (Vockley & Partnership for 21st Century Skills, 2016).

Principals as Facilitators and Their Influence on Technology Integration

The school principal's role entails many responsibilities, and the role continues to evolve due to ever-evolving organizational needs (Richardson, Watts, Hollis, & McLeod, 2016). For decades, educators have expressed the importance of the principal as the instructional leader of the school (Quinn, 2001). As the instructional leader, "principals are responsible for informing teachers about new educational strategies" (Quinn, 2001, p. 1), which includes the most recent innovations in technology and other tools that teachers utilize within their classrooms to provide effective instruction (Quinn, 2001). According to Dawson and Rakes (2003), many educators and national leaders promote the use of technology to improve education and perceive technology as the linchpin in any effort to prepare students for the 21st century. Dawson and Rakes further

accentuated that technology integration is a change that has been met with resistance among teachers.

Researchers (e.g., Dawson & Rakes, 2003; Holland & Moore-Steward, 2000) have theorized that the principal is a key facilitator in the effort to infuse technology into the school. One causal reason for the lack of attention to the needs of teachers concerning technology is the lack of participation in staff development by school administrators; consequently, principals find it difficult to support an innovation about which they have little knowledge. Richardson et al. (2016) proclaimed that principals should be effective facilitators of professional learning. Richardson et al. further cited that facilitating classroom teachers' efforts to gain knowledge and skills to propel effective instruction is a crucial domain of school principals' instructional leadership.

To contribute to a research rationale for developing successful training models for administrators, Dawson and Rakes (2003) investigated whether technology training that was received by K-12 principals influenced the integration of technology into classrooms. The study examined the levels of technology integration into the school's curricula with regard to the extent and type of technology training that was received by principals.

Dawson and Rakes's (2003) research framework was grounded theoretically in the work of Crandall and Loucks's (1982) study of supporting school improvement efforts. Crandall and Loucks reported that principals in facilitator roles ranged widely in the skills and understandings that were needed to be successful; hence, required training prepared them for their tasks as implementation leaders. Dawson and Rakes's (2003) study supported Crandall and Loucks's (1982) contentions. The findings of Dawson and

Rakes (2003) indicated that schools led by principals who received training focused on curriculum-specific technology had higher levels of technology integration. Statistically significant differences were found for the amounts and types of technology training principals that received. Data indicated that the age of the principal also influenced technology integration into the curriculum. Moreover, because the study's findings showed that the amount and types of training were significant to technology integration, Dawson and Rakes proposed that school districts and universities should increase technology training specifically designed for school administrators.

Vision for Technology

According to Brooks-Young (2009), the year 2001 was a pivotal year for educational leaders and technologists from across the globe. The consortium gathered to articulate a set of technology standards that could address the needs of school leaders (as cited in Richardson, Flora, & Bathon, 2013, p. 144). Since that time, the National Educational Technology Standards for Administrators (NETS-A), today known as the ISTE Standards for Educational Leaders (ISTE, 2018), have been adopted by many states and educational leadership preparation programs as a foundational framework for modern school leadership. Richardson et al. (2013) cited that the widespread adoption of the standards were "largely a reaction to a paradigmatic shift where school leaders have come to understand that modern technologies are creating new challenges and unique opportunities for educational systems" (p. 144). The school leader, being the pivotal influence for navigating school change, should embrace and prepare for this new learning environment through a core vision of technology integration for the school. Until recently, little scholarly examination of this focal role for school leaders existed.

Richardson et al. (2013) conducted a study that focused on understanding how and to what extent school leaders shifted their vision of school technology leadership as a result of being exposed to theoretical, practical, and empirical data that were focused on school technology leadership. The core assumption of this research was that school leaders should lead schools with a clear vision of how technology will and can be used to enhance the educational learning experiences of all students and teachers.

Richardson et al. (2013) research framework was grounded conceptually in the most recent NETS-A as developed by ISTE. In this qualitative study, the researchers took a phenomenological approach to explore and understand shifts in creating a vision for school technology leadership. The phenomenon under investigation in this study was the process of setting a school technology vision. The goal was to understand how current school leaders created meaning with regard to school technology leadership visioning.

The population for this study included two cohorts of doctoral-level students over a span of two years. The study consisted of 20 students. All participants were current school leaders who were seeking a Doctor of Education in Educational Leadership from a mid-sized, regional university. Although students were given the option to not participate, the participation rate was 100%. The first group consisted of 13 students, including two males and 11 females. The second group consisted of seven students, including three males and four females. The entire population for the study consisted of 25% males (n = 5) and 75% females (n = 15; Richardson et al., 2013).

Prior to the intervention, educational leadership doctoral students were asked to write their vision statement for school technology leadership. After completing a three-credit hour graduate level course developed around the NETS-A, the students were asked

to revise their vision statement. Pre- and post-treatment analyses were conducted to determine the depth of conceptual shifts as measured by the technology leadership standards. The researchers found that each student experienced shifts in their vision that more closely aligned to the NETS-A. As the larger takeaway, if educational leadership programs want to develop 21st century leaders whom could lead technology-suffused schools, then they should create meaningful experiences that combine technology and leadership. Technological-suffused change is a seismic step that requires new lines of thought and expanded scopes of vision (Richardson et al., 2013).

Principal Perceptions of Their Leadership Behaviors

Dutta and Sahney (2016) cited leadership as a widely-acknowledged key determinant of student achievement. The researchers further suggested that studies across diverse countries and socio-economic backgrounds exhibited similar traits and practices shared by effective school leaders, thereby reinforcing the widespread appeal of school leadership. Leithwood (2008) declared, "School leadership is second only to classroom teaching as an influence on pupil learning" (as cited in Dutta & Sahney, 2016, p. 941).

Guided by strong evidence from theories on school leadership and work psychology, Dutta and Sahney (2016) hypothesized relations among dimensions of principals' instructional and transformational leadership behaviors, teachers' perceptions of the school climate (e.g., social and affective and physical environment), and their job satisfaction and student achievement. The benefits of the principal's leadership behaviors for student achievement were hypothesized primarily as either indirect, with a weak or statistically non-significant direct positive, effect on student outcomes. Path modeling was applied to validate a mediated-effects model using cross-sectional survey data,

including 306 principals and 1,539 teachers from 306 secondary schools in the two Indian metropolitan cities.

Principal leadership behaviors were not associated directly with either teacher job satisfaction or school-aggregated student achievement. Rather, the transformational leader behavior showed an indirect effect on teacher job satisfaction through the social and affective component of the school climate. The physical climate, however, appeared to play a dominating role in mediating the instructional leadership effects on teacher job satisfaction. Comparing the relative indirect effect sizes of the instructional and transformational leadership behaviors on student achievement, principals appeared to favor the former approach (Dutta & Sahney, 2016).

Dutta and Sahney's (2016) study provided further empirical evidence that instructional leadership better captured the impact of school leadership on student outcomes, when compared to its transformational counterpart. By identifying the relative effects of different leadership practices, school leaders and educational practitioners focused more on altering the distribution and frequency of those practices that work best for ameliorating student achievement levels.

Teachers' Perceptions of Principal Behaviors and Technology Use

Teachers' beliefs profoundly influence teachers' perceptions and judgements, which in turn influence the decisions and actions that they exhibit in their classroom (Palak & Wells, 2009). According to Hsu (2016), teachers' perceptions can be defined as internal constructs through which teachers interpret experiences as well as guide their specific teaching practices. Previous research has recognized the importance of teachers' beliefs and their instructional strategies (Ertmer et al., 2014, p. 403). Many studies have

investigated teachers' beliefs, to include teachers' beliefs toward educational technology and the way that teachers use technology to improve student learning outcomes. Yet despite these numerous findings, research is still needed to explicate the relationship between teachers' pedagogical beliefs and their use of technology that support 21st century teaching and learning. Furthermore, research is needed to continue to inform our understandings of the relationship between teachers' beliefs and technology use, including barriers that impact its enactment (Ertmer et al., 2014; Palak & Wells, 2009).

The integration of technology into teachers' classroom practices is influenced greatly by and correlate closely to their attitudes towards educational technologies. Research has also shown that principals' technology leadership could be correlated with teachers' integration of educational technology into classroom teaching (Celep & Tülübaş, 2014). Celep and Tülübaş's (2014) study aimed to explore the effect of secondary school principals' technological leadership on teachers' attitude towards educational technology. The statistical analysis revealed that principals' technological leadership had little effect on teachers' positive attitude towards the use of educational technologies and did not have a significant effect on their negative attitudes.

Hallinger and Murphy (2012) wrote, "While effective leadership cannot guarantee successful education reform, research affirms that sustainable school improvement is seldom found without active, skillful, instructional leadership from principals and teachers" (as cited in Gurley, Anast-May, O'Neal, & Dozier, 2016, p. 1). Using Hallinger and Murphy's (1985) Principal Instructional Management Rating Scale, Gurley and colleagues (2016) measured self-perceptions that were held by school principals regarding specific instructional leadership behaviors and compared to the perceptions that

were held by teachers in these principals' schools. While findings revealed no significant differences between participant groups, the researchers suggested that others could further explore why some principals perceive themselves as more frequently engaged in instructional leadership behaviors than do their teachers and why some principals and teachers reported these opposite perceptions.

To bridge the gap in the literature regarding the relationship between teachers' beliefs and their instructional technology practices, Palak and Walls's (2009) sequential mixed methods design sought to examine the relationship between teachers' beliefs and their instructional technology practices. Results from the quantitative phase revealed that teachers' attitudes toward technology were the most significant predictor for teachers' and students' technology use and for the variety of instructional strategies by teachers. Conversely, the qualitative phase revealed that technology itself did not mediate the changes in the way that teachers taught in the classroom. The way that they taught, especially ways that they had students use technology, were influenced primarily by the teachers' educational beliefs and of what they believed to be good teaching. Future technology research should use mixed methods and consider teachers' beliefs if change in practice is the desired outcome.

Digital-Age Learning Cultures

The rapid acceleration of technology has forever changed the way that teachers teach, students learn, and administrators lead digital-age learning cultures in K-12 schools (Larson, Miller, & Ribble, 2010; Tadeja, 2015). With new literacies rapidly outpacing traditional literacies that are compounded with access to information technology, educational leaders are challenged to move schools into the digital age

(Larson et al., 2010). Leadership of this transformation is requiring new knowledge and skills on the part of school leaders. Technology is now an integral part of all facets of our lives, including the learning culture in schools (Callan, 2011).

According to the School Superintendents Association, a digital-age learning culture "seamlessly integrates technology and technology applications that develop the skills that learners will need to function in a digital world into the repertoire of tools that students use daily" (as cited in Tadeja, 2015, p. 2). In digital-age learning cultures, teachers are able to motivate a new and different type of learner (Larson et al., 2010). Learning opportunities are no longer restricted within the walls of the classroom, rather learning is personal and engaging.

As digital-age learning is ever-evolving, the educators' interconnectivity with it becomes increasingly more important, at least according to the article, *5 Considerations for Digital Age Leaders* (Larson et al., 2010; Tadeja, 2015). The authors outlined the considerations for digital age leaders, which included making sure that there are visionary leadership, an established digital age learning culture, systemic practice, excellence in professional practice, and digital citizenship.

Tadeja (2015) conducted a study of superintendent digital-age learning culture leadership practices. The purpose of the descriptive survey study was twofold. First, the purpose was to investigate and describe strategies utilized by school district superintendents to create, promote, and sustain a digital-age learning culture. Second, the purpose was to investigate what these superintendents perceived to be the greatest challenges that were related to leading a digital-age learning culture and what they believed was needed to address the challenges. An online survey consisting of both

quantitative and qualitative questions was administered to a population of California superintendents.

The findings of Tadeja's (2015) study suggested that superintendents needed to develop a clear vision, place heavy emphasis on professional development, and collaborate with the community to make funding the utmost priority. While Tadeja's study was specific to examining school district superintendents, principals should demonstrate a keen understanding of teaching, learning, and what works for students. The relationship and connection that the superintendents developed among their principals paved the way for constructive change in the organization (Tadeja, 2015). Table 6 provides a concept analysis for the reviewed studies that are related to technology leadership vision, principals' and teachers' perceptions of leadership behaviors and technology use, and digital-age learning cultures.

Table 6

Concept Analysis Chart: Technology Leadership Vision

STUDY	PURPOSE	PARTICIPANTS	DESIGN/ ANALYSIS	OUTCOMES
Dawson and Rakes (2003)	Investigated whether technology training that was received by principals influenced the integration of technology into classrooms.	K-12 principals	ANOVA	Statistical significance was found for amounts and types of technology training that principals received. Data showed that the age of the principal also influenced technology integration into the curriculum.
Palak and Walls (2009)	Examined the relationship between teachers' beliefs and their instructional technology practices.	Technology using teachers	Sequential mixed methods	Quantitative phase revealed that teachers' attitudes toward technology were the most significant predictor for teachers' and students' technology use. Qualitative phase revealed that technology itself did not mediate the changes in the way that teachers taught in the classroom.
Richardson et al. (2013)	Expanded the scholarly base on school technology leadership by examining vision.	Two cohorts of doctoral-level students	Qualitative: Inductive analysis	This study indicated that shifts in school technology leadership visions occurred when the content of the graduate course work was aligned closely with the NETS-A.
Dutta and Sahney (2016)	Hypothesized relations among principal leadership behaviors on student outcomes.	Principal and teachers in two Indian metropolitan cities	Meta-analysis: Path modeling was applied to validate a mediated-effects model.	Principal leadership behaviors were not associated directly with either teacher job satisfaction or school-aggregated student achievement.
Gurley et al. (2016)	Measured self-perceptions that were held by school principals regarding specific instructional leadership behaviors and compared to the perceptions that were held by teachers in these principals' schools.	Principals and teachers in a mid-sized U.S. school district	Quantitative	Findings revealed no significant differences between participant groups.
Tadeja (2015)	Investigated strategies that were utilized by school district superintendents to create, promote, and sustain digital-age learning cultures and the challenges in leading digital-age learning cultures.	K-12 California superintendents	Descriptive study with qualitative and quantitative data analysis	Analysis and interpretation of the data revealed that a shared vision for technology-supported learning was key.

Summary

Shapley, Sheehan, Maloney, and Caranikas-Walker (2011) contended that providing the skills that are needed by 21st century learners challenge schools to move beyond conventional modes of teaching and learning. Shapley et al. further suggested that the most effective technology implementation in schools had schools with strong technology leadership, affirming their belief that principal technology leadership makes a difference on the pedagogy of effective practices for teaching and learning (as cited in Holland, 2015, pp. 11-12). Based on the review of literature, the research believes that the school leader, being the pivotal influence for navigating school change, should embrace and prepare for this new learning environment through a core vision of technology integration for the school.

The literature that was presented gave relevant details that supported technology integration as a critical factor of a 21st century education and that teachers are critical components in enacting educational change. Prevalent research has focused on examining pedagogical conditions around teachers and technology integration, leaving a research gap around examining the principal leadership role on teaching and learning.

Robinson et al. (2008) examined the relative impact of different types of leadership styles on students' academic and nonacademic outcomes. Findings suggested that the more leaders focused on the core business of teaching and learning, the greater their influence on student outcomes. Fox and McDermott (2015) explored how educators and school systems engaged adults and students in 21st century education, and their findings indicated a need for district and school leaders to have a clearer understanding of 21st century skills that influence on student learning. Cruickshank (2017) mentioned

substantial research exists about how classroom and school conditions could influence student learning; however, less research focuses on how principals can influence those conditions positively.

The researcher sought to have a deeper understanding of the impact of principal leadership on technology integration. The purpose of this study was to examine K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. Chapter III will explore the methodology of this study, including a discussion of the instrument, population and sample, data collection, and data analysis.

CHAPTER III

METHODOLOGY

Research supports that technology leadership matters for promoting teachers' uses of technology, and, consequently, administrators should be cognizant of their role in leading their schools' technology integration to be successful (Schrum et al., 2011). According to Thannimalai and Raman (2018), several research studies (e.g. Albion, 2006; Davies, 2010; Greaves, Hayes, Wilson, Gielniak, & Peterson, 2010; Richardson, Bathon, Flora, & Lewis, 2012) have reported that principals' leadership influences technology integration, which in turn has a positive impact on the improvement of student achievement. Further, the school principal's leadership role has increasingly become more challenging as schools are tasked to produce "a skilled and creative workforce to meet the demands of the digital economy but rather reengineer the way that students think in a constantly transforming era" (as cited in Thannimalai & Raman, 2018, p. 204). Despite these findings, research on the leadership of principals is lacking (Thannimalai & Raman, 2018). This study examined K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration.

In this chapter, the researcher presents the methodology that was used to complete this study. Additionally, the researcher reexamines the research problem, lists the research questions and hypotheses, and provides a justification for the research method and the research design. Furthermore, the researcher includes a description of the selected

participants, as well as discusses the instrument that was chosen for the study. Finally, this chapter lists the data collection and analysis procedures. This chapter concludes with a summary of the chapter's main points.

Research Design

The overarching research question that guided this study was: What is the difference between K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration? The researcher examined principals' and teachers' knowledge of Teacher Digital Age Learning and Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory*. The supporting research questions and hypotheses on which this study was based were as follows:

1) What is the difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory?*

H_o: There is not a statistically significant difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

H_a: There is a statistically significant difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

2) What is the difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory?*

H_o: There is not a statistically significant difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

H_a: There is a statistically significant difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

The purpose of this quantitative causal-comparative research was to determine if differences existed between principals' and teachers' perceptions of instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. For this study, the grouping independent variable was K-12 principals and teachers. The two dependent variables were K-12 principals' and teachers' knowledge of Teacher Digital Age Learning and Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

A causal-comparative design is a common research design in educational research studies, which examines differences between independent and dependent variables post an action or event. Salkind (2010) noted that a few aspects of causal-comparative research parallel and contrast other research designs. The premise of both causal-comparative and experimental research is to examine a cause and effect relationship. Similarly, the goal of both types of research is to determine the effect of the independent

variable(s) on the outcome, or dependent variable(s), by comparing two or more groups of individuals. While the premises of the research designs are comparable, major distinctions exist. Experimental research designs allow for random sampling; whereas, in causal-comparative research, the subjects are already in groups. There are times when a causal-comparative research provides a more viable research method (Salkind, 2010).

Like other research designs, causal-comparative research has its advantages and disadvantages. A causal-comparative design is used as an alternative to experimental design because, sometimes, the latter is expensive, non-feasible, and difficult to conduct (Salkind, 2010). In addition, causal-comparative research also provides a viable form of research when independent variables are not capable of being manipulated (Salkind, 2010). Schenker and Rumrill (2004) also noted that this design is appropriate when the researcher cannot manipulate the independent variable. Despite many key advantages, causal-comparative research does have some serious limitations that should be considered. As aforesaid, causal-comparative research occurs ex post facto; hence, the researcher has no control over the variables and thus cannot manipulate them (Salkind, 2010). Another limitation is the inability to construct random samples. Without random assignment, the results cannot be generalized to the public, and the researcher's results are limited to the research study's population (Salkind, 2010).

During the decision-making process, the researcher ruled out both a qualitative research design and a mixed methods research design based on the characteristics of the current research study. In qualitative research, researchers tend to employ subjective and exploratory methods, collect data through narrative form, and categorize the data to identify themes that correspond with the research questions (Creswell, 2012).

Conversely, in quantitative research, researchers tend to employ objective and structured methods, gather data using instruments, and use statistical analysis methods to analyze the data. Mixed method designs allow for collecting, analyzing, and mixing of quantitative and qualitative data to understand a research problem (Creswell, 2012).

In this research study, the researcher examined principals' and teachers' perceptions. This study employed a non-experimental, causal comparative quantitative design using data that were collected via an online survey to measure and statistically analyze how principals and teachers (i.e., independent variables) differed on their perceptions of Teacher Digital Age Learning and Instructional Digital Age Learning (i.e., dependent variables). The researcher could not manipulate the independent variables, as they were preformed groups. In sum, qualitative and mixed method designs did not lend themselves to be appropriate research designs for this research study.

Role of the Researcher

The essential characteristics of quantitative and qualitative methodical approaches to research differ in nature. The researcher's model will impact the research design and the manner in which the data are collected and analyzed (Giampapa, 2016). Moutinho and Hutcheson (2011) noted that a major difference between qualitative and quantitative research is the underlying assumptions about the researcher's role. Moutinho and Hutcheson positioned the qualitative researcher as an objective observer that neither participates in nor influences what is being studied. Giampapa (2016) distinguished the two roles based on the researcher's presence in discussions, noting the role of the researcher in quantitative studies is absent traditionally in discussions, whereas in

qualitative research, the role of the researcher is quite different. A qualitative researcher is more immersed in the research discussion.

The research for this quantitative study was conducted in one school system in a metropolitan area of Georgia, where the researcher was employed. The researcher administered the survey and collected the data using the standardized procedures, including employing convenience sampling strategies and establishing reliability and validity checks of the instrument. The data analysis was performed using rigorous statistical analysis techniques, and the results were interpreted.

Alignment to District's Governance Framework

During the spring of 2018-2019 school year, the district governance board shared an established set of priorities, which included *to unify excellence, to strengthen the core business of student learning,* and *to ensure a high-performing environment for all students*. These priorities now coupled with an established set of shared beliefs and commitments and a theory of planned action frames, i.e., the district's compass, which will navigate the district's long-range strategic plan of creating and sustaining a high-performing school district with a core purpose on student learning (Governance Framework, 2019).

Given the accountability in educational organizations and the relationship between instructional leadership practices and student achievement, research has noted the vital importance of instructional leadership in leading the transformation of teaching and learning (Shepherd & Taylor, 2019). With a laser focus on strengthening the core business of student learning, school principals, as instructional leaders, are at the helm of

leading teachers to cultivate learning environments, which provide effective, aligned, and rigorous instruction (Governance Framework, 2019).

Based on current research and literature, Shepherd and Taylor (2019) stated that, as instructional leaders, administrators review curriculum plans, perform frequent classroom observations to evaluate the curriculum, and analyze teachers' instructional practices. Because administrators are at the helm, their copious influence within the school regarding the school's integration of technology is of vital importance. For that reason, it is essential that administrators be prepared sufficiently to assume the role of digital instructional leaders to ensure that technology integration permeates all aspects of the teaching and learning process (Shepherd & Taylor, 2019).

Technology seemingly continues to infiltrate teaching and learning. Administrators are unable to sustain traditional leadership styles and to isolate from these educational developments, as technology has reshaped education in many ways (Akcil, Aksal, Mukhametzyanova, & Gazi, 2017). In the wake of the COVID-19 global pandemic that has affected most parts of the world profoundly, a paradigm shift in terms of learning worldwide now exists. Most educational institutions around the world are moving away from the traditional face-to-face classroom to digital learning (Mulenga & Marbán, 2020). Amidst all of this transformation, federal and state governing agencies along with district governance boards and district leaders had to re-evaluate digital learning. Subsequently, instructional leaders should focus on integrating technology into their leadership processes (Mulenga & Marbán, 2020).

In response to the global pandemic and with the increased emphasis on technology integration, future educational leaders will need adequate preparation to

ensure that they are prepared to lead within this ever-evolving 21st century school environment. Educational organizations and leadership programs that are striving to excel in the 21st century should cultivate leaders who articulate a clear vision for incorporating technology in teaching and learning (Shepherd & Taylor, 2019).

This study will afford principals who are leading within 21st century school environment to reflect on their current knowledge to act as technology instructional leaders. District leaders responsible for principal leadership programs could benefit from this research. With the increased emphasis on technology integration, the findings of this study could provide useful data for school district's leadership development programs to cultivate strategies that assist principals in their acquisition of knowledge and skills regarding technology in schools (Shepherd & Taylor, 2019).

Participants

The populations of participants who were of interest to the researcher were K-12 principals and teachers working with students in elementary and secondary grades in the state of Georgia. Due to the design of the study being causal-comparative, the inability to construct random samples, which limited the generalizability of the results, posed limitations (Salkind, 2010). The sampling procedure in this study was defined by convenience, due to the proximity of the selected district to the researcher. In convenience sampling, “researchers select participants because they are willing and available” (Creswell, 2012, p. 145).

The sampling frame consisted of all teachers and principals currently working in in all schools of the selected district. According to the district’s *Fast Facts* publication (Targeted School District, 2019), this eighth largest district in the state had a student

population of approximately 43,000 students who were served by 5,000 employees. The district had 50 schools that were branched into 10 high schools, 11 middle schools, 28 elementary schools, and one alternate education academy school within 10 clusters. In addition, the district had one career academy and one blended learning academy. Noted as a one-to-one technology district, all K-12 students in the cooperating district were connected by 45,000 devices. All students in Grades 3 through 12 were issued a Chromebook for educational purposes, while teachers in Grades K-2 had a set of 30 iPads. According to the district's report card that was published by the Governor's Office of Student Achievement (2019), the racial classification of students within the district was approximately 55% Black and approximately 27% White. The ethnic classification included approximately 10% Hispanic and approximately 8% Asian, Native American, and other designations. Further, approximately 50% of the students were classified as economically disadvantaged, as defined by qualification for free or reduced priced lunch. According to the proposed research authorization that was provided by the district, each of the schools participating in this study provided education to students in kindergarten through Grade 12.

The focus of this study was concerned with the perceptions of both principals and teachers. Drawing from the sampling frame, the population for this study consisted of K-12 principals and teachers who were sampled conveniently from 12 of the 50 schools in the selected district. The district's report card published by Governor's Office of Student Achievement (2019) classified the racial classification of administrators and teachers in the selected school system as 39% Black and 56% White, and the ethnic classification included 1% Hispanic, Asian, Native American, and other designations. Of the

aforementioned, 22% were males, and 78% were females. Participation in this study was voluntary. Participants were asked to self-identify their role, as a principal or a teacher, and also for their demographic information. Electronic methods were utilized as email school server lists were obtained for distribution of study information and survey links. As the Information Services Division in the selected district maintained employee listings monthly, the potential for missing elements and duplications were minimized or eliminated.

The researcher conducted a G*Power analysis to determine the approximate number of survey responses that should be received from K-12 principal and teacher participants. The researcher considered several variables prior to conducting the G*Power analysis. The researcher used .50 for Cohen's *d*, which represents a medium effect size, and .05 for the critical *p* value. The G*Power analysis computations for two groups indicated that the researcher needed a minimum of 34 participants (Faul, Erdfelder, Lang, & Buchner, 2007).

Instrumentation

The adapted *21st Century District Level Instructional Leadership Inventory* (Arrington, 2014) was the survey that was used for this study. Arrington's (2014) instrument was designed to identify district instructional leaders' knowledge that was necessary to lead teachers in developing 21st century classroom structures and instructional practices that were identified through a comprehensive review of the literature and ISTE's NETS for Students, Teachers, Administrators, and Coaches. Arrington developed an internet-accessible survey, which consisted of 76 items using a Likert-type five-point rating scale, three open-ended items, and six demographic items.

Arrington identified five elements of knowledge to use in the survey, which included Teacher Digital Age Learning, Instructional Leader Digital Age Learning, Digital Citizen Digital Citizenship, Teacher Digital Citizenship, and Instructional Leader Digital Citizenship. The demographic information (i.e., Element 6) assisted the researcher to gain a better understanding of the participants and the different instructional leadership roles. The distractor items (i.e., Element 7) were items in the survey that were not part of the knowledge. Appendix B provides a detailed table of elements and items from the original study (Arrington, 2014).

To gather principals' and teachers' perceptions of instructional leadership behaviors and 21st century knowledge and skills, the current researcher utilized two elements of knowledge from Arrington's (2014) instrument (i.e., Teacher Digital Age Learning and Instructional Leader Digital Age Learning). These two elements of knowledge consisted of 39 items using a Likert-type five-point rating scale. The 39 items expanded across four sub-dimensions from the original instrument, including It is Important that School Instructional Leaders dimension, As a School Instructional Leader dimension, Importance of Teaching Students 21st Century Skills dimension, and Assess Your Knowledge of 21st Century Skills dimension.

The researcher developed nine demographic items (Appendix A), which resulted in 48 survey items. Table 7 displays those additional demographic items that were developed by the researcher. The answer choices were displayed as multiple-choice options. For the purpose of this study, the researcher referenced the research instrument as the *21st Century Instructional Leadership Inventory*.

Table 7

Demographic Questions Developed by the Researcher

Demographic Item	Answer choices
1. What is your role? *(Condition: If participant selects teacher, survey will proceed to next question.)*	○ School Principal ○ K-12 Teacher
2. *Teacher Only:* Select the response that best indicates the content area in which you currently teach.	○ Elementary teacher ○ English Language Arts ○ Math ○ Science ○ Social Studies ○ Career, Technical and Agricultural Education (CTAE) ○ World Language ○ Fine Arts ○ Health and/or P.E. ○ Exceptional Student Education ○ Other
3. Select the response that describes your gender.	○ Male ○ Female
4. Select the response that best indicates the grade span in which you currently serve as principal or teacher.	○ Elementary school (Grades K–5) ○ Middle school (Grades 6-8) ○ High school (Grades 9–12) ○ Other (K-12)
5. Select the response that best indicates the number of years you have been in the role of principal or teacher.	○ 0 to 4 years ○ 5 to 9 years ○ 10 to 14 years ○ 15 to 19 years ○ 20 to 24 years ○ 25 or more
6. Select the response that describes your years of experience in education.	○ 0 to 4 years ○ 5 to 9 years ○ 10 to 14 years ○ 15 to 19 years ○ 20 to 24 years ○ 25 or more
7. What is your highest educational level?	○ Bachelor's Degree ○ Master's Degree ○ Leadership endorsement ○ Educational Specialist ○ Doctorate
8. Select the response that best describes how many years ago you took your last postsecondary course?	○ Less than 1 year ○ 1 to 5 years ○ More than 5 years
9. Select the response that best describes how many years ago you took your last technology-related course?	○ Less than 1 year ○ 1 to 5 years ○ More than 5 years

The researcher of the current study secured permission via email to utilize the *21st Century District Level Instructional Leadership Inventory* (J. Arrington, personal communication, December 30, 2019). An adapted form of the instrument was used in the current study to collect data from principals and teachers of schools in an attempt to examine the perceived instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. A copy of permission to utilize the instrument can be found in Appendix C.

The 48 survey items was administered via an online survey system. For Dimension 1 (It is Important that School Instructional Leaders) and for Dimension 2 (As a School Instructional Leader), responses included *Strongly Disagree, Disagree, Undecided, Agree,* and *Strongly Agree*. Dimension 1 consisted of eight questions, and Dimension 2 consisted of nine questions. Dimension 3 (Importance of Teaching Students 21st Century Skills), the responses included *Unimportant, Of Little Importance, Moderately Important, Important,* and *Very Important*. For Dimension 4 (Assess Your Knowledge of 21st Century Skills), responses included *Very Limited or No Knowledge, Limited Knowledge Level, Moderate Knowledge Level, High Knowledge Level,* and *Very High Knowledge* or *Expert*. Dimension 3 consisted of 12 questions while Dimension 4 consisted of 10 questions (Arrington, 2014). The survey demographic data were used to conduct a descriptive analysis of the sampled population. Participants were provided nine questions, which collected demographic data about their group identification (i.e., K-12 principal or teacher), gender, race, the grade span of their building, years in current role,

years of experience education, and number of years since the participants had taken a technology-related course.

Items from the previous study were examined and modified in the development of survey items that were used to address the research questions in this study. Due to the nature of the current study's research questions and research design, the following survey items from the previous study (Arrington, 2014) were eliminated for use in this current study: Items 68 through 70 (Element 3: Digital Citizen Digital Citizenship), Items 13 through 18 and Items 20 through 22 (Element 4: Teacher Digital Citizenship dimension), Items 4, 7, 11, 26, 29, 32, and 36 through 38 (Element 5: Instructional Leader Digital Citizenship), and Items 12, 19, 34, 41, and 71 (Element 7: Distractors). Three open-ended questions (i.e., Items 77 through 79) that each extended across all elements were removed as they were not needed in this study's quantitative research design. Items 80 through 85 (Demographics dimension) focused primarily on demographics and gathered information to identify the subsets of population in the original study were expanded and modified to fit the current study's population.

Validity

The adapted *21st Century Instructional Leadership Inventory* used for this study was tested for validity by its author, Arrington (2014). The researcher collaborated with educational researchers at the national and regional level within his organization, members of an educational research lab, and his advisor regarding question development and survey design. The educational researchers reviewed the survey and made recommendations concerning question format and placement in the survey, as well as suggestions about distractor questions and reducing bias. All recommendations were

implemented and were reflected in the survey. Immediately following approval of the researcher's study proposal, the survey instrument was piloted in one district, where no necessary changes were identified (Arrington, 2014). Table 8 provides a listing of all items in the current data collection instrument, the literature that supported the inclusion of the item in the data collection instrument, and the research question that each item sought to answer.

Table 8

Quantitative Item Analysis Chart

Original Item	Research	Revised Item Number
Element 1		
1. Models effective classroom management	Arrington, 2014; Ugur & Koc, 2019	1
2. Maintains and manages a variety of digital tools and resources for teacher and student use	Arrington, 2014; Lewis, 2016	2
3. Coaches teachers in and models use of collaborative learning networks	Arrington, 2014; Ugur & Koc, 2019	3
4. Troubleshoots basic hardware problems common in digital learning environments	Arrington, 2014; Machado & Chung, 2015	4
5. Collaborates to evaluate digital tools and resources that enhance teaching and learning	Arrington, 2014; Gurley et al., 2015	5
6. Stimulates creativity	Arrington, 2014; Shepard & Brown, 2014	6
7. Facilitates the use of adaptive and assistive technologies to support student learning	Arrington, 2014; Potter & Rockinson-Szapkiw, 2012	7
8. Enable all students to pursue their individual curiosities	Arrington, 2014; Thannimalai & Raman, 2018	18
9. Develop technology-enriched learning environments	Arrington, 2014; Fox & McDermott, 2015	19

Original Item	Research	Revised Item Number
10. Provide students with multiple and varied formative assessments	Arrington, 2014; Brown & Jacobsen, 2016	20
11. Align assessments with content standards	Arrington, 2014; Brown & Jacobsen, 2016	21
12. Use assessment results to inform learning and teaching	Arrington, 2014; Brown & Jacobsen, 2016	22
13. Customize and personalize learning activities	Arrington, 2014; Herold, 2016	23
14. Utilize digital tools and resources to address students' diverse learning styles	Arrington, 2014; Lewis, 2016	24
15. Enable all students to participate in setting their own educational goals	Arrington, 2014; Thannimalai & Raman, 2018	25
16. Provide students with multiple and varied summative assessments	Arrington, 2014; Brown & Jacobsen, 2016	26
17. Incorporate digital tools and resources to promote student creativity	Arrington, 2014; Shepard & Brown, 2014	27
18. Align assessments with technology standards	Arrington, 2014; Brown & Jacobsen, 2016	28
19. Enable all students to assess their own progress	Arrington, 2014; Thannimalai & Raman, 2018	29
Element 2		
20. Model collaborative learning strategies	Arrington, 2014; Lewis, 2016	9
21. Maximize teacher and student access to technology-rich learning environments	Arrington, 2014; Shepard & Brown, 2014	10
22. Coach teachers in and model use of online and blended learning	Arrington, 2014; Herold, 2016	11
23. Select adaptive and assistive technologies to support student learning	Arrington, 2014; Potter & Rockinson-Szapkiw, 2012	12

Original Item	Research	Revised Item Number
24. Collaborate to select digital tools and resources that enhance teaching and learning	Arrington, 2014; Gurley et al., 2015	13
25. Provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners	Arrington, 2014; Shepard & Brown, 2014	14
26. Troubleshoot basic software problems common in digital learning environments	Arrington, 2014; Machado & Chung, 2015	15
27. Promote and participate in local learning communities	Arrington, 2014; Shepherd & Taylor, 2019	16
28. Use digital-age communication and collaboration tools to interact with parents	Arrington, 2014; Thannimalai & Raman, 2018	17
29. Maximizing teacher and student use of digital tools and resources	Arrington, 2014; Lewis, 2016	30
30. Expanding opportunities and choices for online professional development for teachers	Arrington, 2014; Schrum & Levin, 2011	31
31. Troubleshooting basic connectivity problems common in digital learning environments	Arrington, 2014; Machado & Chung, 2015	32
32. Selecting and evaluating digital tools and resources compatible with the school technology infrastructure	Arrington, 2014; Lewis, 2016	33
33. Using digital communication and collaboration tools to communicate globally	Arrington, 2014; Thannimalai & Raman, 2018	34
34. Ensuring effective practice in the study of technology and its infusion across the curriculum	Arrington, 2014; ISTE, 2016	35
35. Promoting and participating in global learning communities	Arrington, 2014; Thannimalai & Raman, 2018	36
36. Evaluating the use of adaptive and assistive technologies to support student learning	Arrington, 2014; Shepard & Brown, 2014	37

Original Item	Research	Revised Item Number
37. Coaching teachers in and modeling use of digital content	Arrington, 2014; Lewis, 2016	38
38. Stimulating digital age collaboration	Arrington, 2014; Fisher & Waller, 2013	39
Element 3		
39. Professional role	Hallinger, 1985	40
40. Teacher content area	Hallinger, 1985	41
41. Gender	Hallinger, 1985	42
42. Grade span	Hallinger, 1985	43
43. Years in role	Arrington, 2014; Hallinger, 1985	44
44. Educational experience	Arrington, 2014, Hallinger, 1985	45
45. Highest educational level	Hallinger, 1985	46
46. Postsecondary course history	Shepherd & Taylor, 2019	47
47. Technology-related course	Arrington, 2014	48

Reliability

Cronbach's alpha is the most widely used measurement for analyzing the reliability of items on Likert-style survey instruments (Salkind, 2010). Salkind (2010) noted that an acceptable level for Cronbach's alpha coefficient is .70 or above when evaluating reliability of variable scale items within a construct or element. Because the original survey instrument used primarily a continuous variable scale, the reliability of the survey instrument was examined by using the coefficient alpha to test for internal consistency (Arrington, 2014). An analysis using Cronbach's alpha (1984) was performed on each of the quantitative elements, including *Teacher Digital Age Learning, Instructional Leader Digital Age Learning, Digital Citizenship, Teacher Digital Citizenship,* and *Instructional Leader Digital Citizenship*. Each element for the instrument met the .70 or greater standard of acceptability for Cronbach's alpha coefficient (Arrington, 2014). After analyzing the collected data, the researcher for the

current study conducted reliability analyses using Cronbach's alpha to determine if internal consistency existed among the items within each element (Salkind, 2010). The measure was deemed internally consistent based on the reliability analyses. Each dimension for the instrument met the .70 or greater standard of acceptability for Cronbach's alpha coefficient (Arrington, 2014; Salkind, 2010). Table 9 displays the alpha coefficients for each element and dimension by group.

Table 9

Cronbach's Alpha Coefficients for each Element and Dimension by Group

Dimension	Element	Number of Items	School Principal	Teacher
It is Important that School Instructional Leaders	Teacher Digital Age Learning	8	.794	.780
As a School-level Instructional Leader	Instructional Leader Digital Age Learning	9	.835	.747
Importance of Teaching Students 21st Century Skills	Teacher Digital Age Learning	12	.875	.885
Assess Your Knowledge of 21st Century Skills	Instructional Leader Digital Age Learning	10	.803	n/a

Data Collection

While several forms of survey research exist, two major methods educational survey researchers utilize are mailed and web-based questionnaires (Creswell, 2012). Educational researchers should weigh the advantages and disadvantages (i.e., response rates) for both methods. According to Creswell (2012), web surveys may allow for more effective and economical surveying of the population. The researcher created a web-

based version of Arrington's (2014) survey. The survey questions were constructed and presented electronically using the online survey medium, Qualtrics.

After the creation of the web-based version of Arrington's (2014) survey, the researcher completed the CSU IRB application and the district application to conduct research. The researcher received university approval on November 4, 2020 (Appendix D) and district approval on December 7, 2020 (Appendix E). After permission was granted, distribution and data collection began.

The recent global pandemic impelled the district to rethink how research should be conducted. Committed to continuing research while still appropriately protecting research subjects, careful consideration was given to the researcher's proposal. The proposal's approval was subject to prescribed conditions to include an established subgroup of 12 schools, where the research could be conducted. The approved schools consisted of six elementary schools, two middle schools, three high schools, and the career academy. Per approval guidelines, all communications from the researcher had to be sent directly to the principal of the approved school. The researcher could not directly contact teachers or other staff at the school unless specifically directed in writing by the principal. Additionally, no reminders for survey completion were sent.

An email (Appendix F) was sent to principals in each school explaining the study, inviting their participation, and inquiring of their preferred distribution method of the survey with teachers (personal communication, January 6, 2021). Six of the 12 principals responded. Five principals gave the researcher permission to invite teachers to participate in the research survey, and one principal stated that he would share the material from the researcher. The six principals who did not respond to the researcher's communication

defaulted to the option that they would share the material with their respective teachers. The district's Information Services Division provided the email addresses of teachers from the five schools whose principal gave consent for the researcher to share the email invitation.

On January 8, 2021, the researcher sent a recruitment email explaining the purpose of the study, the process of data collection, and the incentive for participation. The recruitment email was sent to participating principals and teachers, according to email lists that were provided to the researcher. The database consisted of principals and teachers who were identified by the district's Information Services Division specifically for the purpose of this study. The email contained the link to the online survey and the time frame that the survey would be open. The email invitation can be found in Appendix G.

The online survey was available to participants for a four-week time frame. The time frame for access to the survey aligned to the original researcher's (Arrington, 2014) window for survey administration. After clicking the link in the email, all potential participants landed at a cover letter inviting them to take part in the study and to complete the survey (Creswell, 2012). Participants were presented with a brief description of the study and consent form. As explained by the consent form, by clicking the *I agree* button, participants granted consent to participate in the study and were provided instructions for completing the survey. Participants could withdraw from the survey at any time by exiting their internet browsers. To gather principals' and teachers' perceptions of instructional leadership behaviors and 21st century knowledge and skills, participants were provided 39 items using a Likert-type five-point rating scale followed by the nine

demographic items, which collected demographic data about their group identification (i.e., K-12 principal or teacher), teacher content area, gender, the grade span of their building, years in current role, years of experience education, educational level, and number of years since the participant had taken a postsecondary and technology-related course.

As part of the revised 2020-2021 guidelines to conduct research in the selected district, email reminders for participants to complete the survey were purged. Principals and teachers were offered an incentive, as recommended by Creswell (2012), to participate in a random drawing for a $50 Amazon gift card in return for completing the survey. The last item on the survey asked each participant to provide his or her name and email address if he or she was interested in being entered into a random drawing for a $50 Amazon gift card for completing the survey. The drawing was held at the end of the data collection process. After the random drawing for the survey incentives, the participants' names and email addresses were deleted from the dataset.

Data Analysis

This quantitative causal-comparative study examined principals' and teachers' differences of instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration using the adapted *21st Century District Level Instructional Leadership Inventory* (Arrington, 2014). SPSS version 23 software was used to examine the quantitative responses in the study.

This study utilized a non-experimental, causal comparative design using data that were collected to measure and analyze how principals and teachers (i.e., independent

variable) differed on their perceptions of Teacher Digital Age Learning and Instructional Leadership Digital Age Learning (i.e., dependent variables). Arrington (2014) referenced indicators of digital age learning in the context of ISTE's educational technology standards as teachers designing, developing, and evaluating authentic learning experiences and assessments while educational administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students (ISTE, 2011).

The researcher captured data using an internet-accessible survey (i.e., Qualtrics) and used statistical procedures to analyze the quantitative survey responses from both group of participants. Principals were defined by the state department of public education as the person who served as administrative head of a school, and teachers were defined as any GaPSC certificate holding educator, who was responsible for a specified portion of a student's learning activities that were within a subject/course and were aligned to performance measures (Georgia Department of Education, 2016, p. 2).

At the end of the data collection process, the researcher downloaded the raw survey data into a SPSS file for data analysis. The researcher filtered all responses to include data from current principals only followed by data from current teachers only. In addition, the researcher screened the data for any missing data that the participants did not provide (Creswell, 2012). A participant's data were deleted from the dataset if he or she did not meet the inclusion criteria, which was a current K-12 principal or teacher.

The researcher's next step in the data analysis process involved the coding of the demographic items and Arrington's (2014) survey items. Arrington's survey items in Dimensions 1 and 2 were dummy coded with a Likert-type five-point rating scale, with 1

representing *Strongly Disagree*, 2 representing *Disagree*, 3 representing *Undecided*, 4 representing *Agree*, and 5 representing *Strongly Agree.* Arrington's survey items in Dimension 3 were dummy coded with 1 representing *Unimportant*, 2 representing *Of Little Importance*, 3 representing *Moderately Important*, 4 representing *Important*, and 5 representing *Very Important*. Arrington's survey items in Dimensions 4 were dummy coded with 1 representing *Very Limited or No Knowledge*, 2 representing *Limited Knowledge Level*, 3 representing *Moderate Knowledge Level*, 4 representing *High Knowledge Level*, and 5 representing *Very High Knowledge* or *Expert*.

Dimension 1 (It is Important that School Instructional Leaders) and Dimension 3 (Importance of Teaching Students 21st Century Skills) of the survey instrument defined Teacher Digital Age Learning. Dimension 2 (As a School-level Instructional Leader) and Dimension 4 (Assess Your Knowledge of 21st Century Skills) of the survey instrument defined Instructional Leader Digital Age Learning. Table 10 displays the pre-dummy coding for the demographic items.

Table 10

Dummy Coding for Demographic Items

Demographic Item	Answer choices	Coding
1. What is your role? *(Condition: If participant selects teacher, survey will proceed to next question.)*	A) School Principal B) K-12 Teacher	A = 1 B = 2
2. *Teacher Only:* Select the response that best indicates the content area in which you currently teach.	A) Elementary teacher B) English Language Arts C) Math D) Science E) Social Studies F) Career, Technical and Agricultural Education (CTAE) G) World Language H) Fine Arts I) Health and/or P.E. J) Exceptional Student Education K) Other	A = 1 B = 2 C = 3 D = 4 E = 5 F = 6 G = 7 H = 8 I = 9 J = 10 K =11
3. Select the response that describes your gender.	A) Male B) Female	A = 1 B = 2
4. Select the response that best indicates the grade span in which you currently serve as principal or teach.	A) Elementary school (Grades K–5) B) Middle school (Grades 6-8) C) High school (Grades 9–12) D) Other (K-12)	A = 1 B = 2 C = 3 D = 4

Demographic Item	Answer choices	Coding
5. Select the response that best indicates the number of years you have been in the role of principal or teacher.	A) 0 to 4 years B) 5 to 9 years C) 10 to 14 years D) 15 to 19 years E) 20 to 24 years F) 25 or more	A = 1 B = 2 C = 3 D = 4 E = 5 F = 6
6. Select the response that describes your years of experience in education.	A) 0 to 4 years B) 5 to 9 years C) 10 to 14 years D) 15 to 19 years E) 20 to 24 years F) 25 or more	A = 1 B = 2 C = 3 D = 4 E = 5 F = 6
7. What is your highest educational level?	A) Bachelor's Degree B) Master's Degree C) Leadership endorsement D) Educational Specialist E) Doctorate	A = 1 B = 2 C = 3 D = 4 E = 5
8. Select the response that best describes how many years ago you took your last postsecondary course?	A) Less than 1 year B) 1 to 5 years C) More than 5 years	A = 1 B = 2 C = 3
9. Select the response that best describes how many years ago you took your last technology related course?	A) Less than 1 year B) 1 to 5 years C) More than 5 years	A = 1 B = 2 C = 3

The researcher utilized demographic item 1 to create two groups (i.e., K-12 principals and teachers). A grouping variable was created and dummy coded using 1 for participants who identified themselves as a K-12 school principal and 2 for participants who identified themselves as a K-12 teacher. This dummy coded variable served as the independent variable for each analysis. For Research Question 1, the dependent variable was Teacher Digital Age Learning. For Research Question 2, the dependent variable was Instructional Leader Digital Age Learning.

Descriptive statistical analysis was performed on the collected data for the survey by item, element, and demographic groups. The groups were based on the demographics, to include group identification (i.e., K-12 principal or teacher), teacher content area, gender, the grade span of their building, years in current role, years of experience education, educational level, and number of years since the participant had taken a postsecondary and technology-related course. The researcher identified and reported the central tendency and dispersion for each element. For each dependent variable (i.e., Teacher Digital Age Learning and Instructional Leader Digital Age Learning), the mean and standard deviation were reported by group, as well as high and low mean scores were discussed (Creswell, 2012).

Levene's Test for Equality of Variances was performed to determine if the assumption of equal variance was met (Salkind, 2010). The researcher used demographic item #1 to create two groups (i.e., principals and teachers). Based on the Levene's Test, the researcher was able to determine whether a statistically significant difference existed between the variances of two groups (Salkind, 2010).

The independent samples *t*-test is a statistical test used to determine whether there are any statistical differences between the means of two or more independent groups (Johnson & Christensen, 2013). For this current study, the researcher used an independent samples *t*-test to determine if K-12 principals' and teachers' perceptions differed based on 21st century knowledge and skills as characterized by the four dimensions in the *21st Century Instructional Leadership Inventory*. Salkind (2010) referenced that one commonly used data analysis method for testing relationships in causal-comparative research is an independent *t* test. An advantage of using an independent *t*-test is that *t*-tests could identify if any two of the group means are significantly different with a single test and can be adjusted for unequal variance among small sample sizes (Salkind, 2010).

Summary

In summary, this study was a comparative analysis of principals' and teachers' perceptions of Teacher Digital Age Learning and Instructional Leader Digital Age Learning. K-12 elementary and secondary principals and teachers conveniently sampled from each of the 50 schools in the selected district were surveyed concerning their knowledge of instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. The researcher used an adapted web-based version of Arrington's (2014) survey via a Qualtrics platform, which was sent via email to participants over a four-week period of time and consisted of 48 items. The data were analyzed in SPSS using a series of independent sample *t*-tests. Chapter IV will present the results of this study by research question.

CHAPTER IV

RESULTS

The need for principals to integrate technology successfully into teaching and learning is ever-increasing. Although educational leaders have had a significant impact on the field of education to integrate technology effectively with the goal of increasing student achievement and overall school performance, most of the research on technology integration has been teacher-focused, rather than on principals' preparation, skill, knowledge, and related leadership (Courville, 2011; Esplin, 2017). Continuation of teacher-focused research, though beneficial, has left a research gap concerning the skills and preparation that are needed by principals to become digital instructional leaders.

Using a causal comparative quantitative research design, this study included K-12 principals and teachers conveniently sampled from 12 elementary, middle, and high schools in the selected district. The study measured principals' and teachers' knowledge of Teacher Digital Age Learning and Instructional Leader Digital Age Learning. The data were collected using the adapted *21st Century Instructional Leadership Inventory* web-based survey instrument. Data were analyzed utilizing a series of independent samples *t*-tests. The purpose of this chapter is to present the study's findings, which allowed the researcher to gain an understanding of the research questions and their related hypotheses. Chapter IV is organized by a discussion of the sample demographics, descriptive statistics, reliability analysis, research question/hypothesis testing, and conclusions. Data were analyzed with SPSS v. 23 for Windows. A series of independent samples *t*-tests were conducted to answer the research questions and hypotheses.

The overarching research question that guided this study was: What is the difference between K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration? Two research questions and two related hypotheses were created for examination and were as follows:

1) What is the difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory?*

H_o: There is not a statistically significant difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

H_a: There is a statistically significant difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

2) What is the difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory?*

H_o: There is not a statistically significant difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

H_a: There is a statistically significant difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*

Participants

The sampling population was sampled conveniently from an approved subgroup of schools, which consisted of six elementary schools, two middle schools, three high schools, and the career academy. Although district permission was granted for the study, each participating principal was given permission by the district to determine whether the researcher or the principal would share the survey material with teachers.

On January 8, 2021, the researcher sent a recruitment email explaining the purpose of the study, the process of data collection, and incentives. The recruitment email was sent to participating principals and teachers, according to email lists that were provided to the researcher. The database consisted of principals and teachers who were identified by the district's Information Services Division, specifically for the purpose of this study. The email contained the link to the online survey and the time frame that the survey would be open. The email invitation can be found in Appendix F. Due to revised guidelines for conducting research, email reminders for participants to complete the survey were expunged. The online survey was available to participants for a four-week time frame.

Eight out of 12 principals responded to the survey, which yielded a 67% response rate. For the teachers, 26 out of the 809 participants from the 12 schools completed the survey, which yielded a response rate of 3%. Six participants started the survey and agreed to participate, but they did not complete at least one of the sections. After data

were cleaned, the number of validated cases (i.e., without missing data) from both groups was 28 (i.e., eight principals and 20 teachers). These 28 participant responses were used to analyze the data. The following section provides a discussion of the samples' demographics. With the restrictions that were placed on the research by the selected district (i.e., 12 schools in the sample), the researcher was unable to reach the 17 participants per group threshold, which could affect the power of the study.

Demographic Data Analysis

Responses within the following tables were derived from the researcher's demographic items. The researcher utilized the responses from Question 1 as the grouping variable for this study. Question 1 asked participants to indicate if their educational role was K-12 principal or teacher. Of the 28 participants, eight (29.0%) indicated a role of principal. Within this group, 25.0% (n = 2) were males, 62.5% (n = 7) were females, and one participant (i.e., 12.5%) did not indicate gender. Twenty participants (71.0%) indicated a role of teacher. Within this group, 30.0% (n = 6) were males, 60.0% (n = 12) were females, and two participants (i.e., 10.0%) did not indicate gender. Table 11 presents the frequencies and percentages of males and females by group.

Table 11

Frequencies and Percentages of Males and Females by Group

	School Principal		Teacher	
Gender	*n*	%	*n*	%
Male	2	25.0	6	30.0
Female	5	62.5	12	60.0
Total	7	87.5	18	90
Missing	1	12.5	2	10.0
Total	8	100.0	20	100.0

Participants who identified themselves with the role of teacher were asked to indicate the content area in which they currently taught. The data indicated that most (i.e., 35.0%) of the teacher participants taught elementary content. The data indicated that 5.0% of participants were an English language arts teacher, social studies teacher, or CTAE teacher. The data indicated that 10.0% of participants were mathematics teachers and 15.0% of participants were science teachers. The second highest percentage of this demographic area indicated that 20.0% of teachers were exceptional student education teachers. The remaining 5.0% indicated a content area of "other". Table 12 presents the teacher participants' responses of content area that they currently taught.

Table 12

Teacher Participants' Responses of Teaching Content Area

Teacher Content Area	*n*	%
Elementary	7	35
English Language Arts	1	5.0
Mathematics	2	10.0
Science	3	15.0
Social Studies	1	5.0
CTAE (Career, Technical, and Agricultural Education)	1	5.0
Exceptional Student Education	4	20.0
Other	1	5.0
Total	20	100.0

Of the eight school principal participants, most of the participants (i.e. 50.0%) served as an elementary school principal, 12.5% (n = 1) served as a middle school principal, and 25.0% (n = 2) served as a high school principal. Of the 20 responses that were included in the teacher group analysis, elementary teachers (n = 8) and high school teachers (n = 8) equally shared the largest percentage at 40.0%. Only 15.0% (n = 3) of the teacher participants served as a middle school teacher. Table 13 displays the frequencies and percentages for current school level by group.

Table 13

Frequencies and Percentages for Current School Level by Group

	School Principal		Teacher	
Grade Level	*n*	%	*n*	%
Elementary School (Grades K-5)	4	50.0	8	40.0
Middle School (Grades 6-8)	1	12.5	3	15.0
High School (Grades 9-12)	2	25.0	8	40.0
Missing	1	12.5	1	5.0
Total	8	100.0	20	100.0

In relation to time that was spent in the role of principal, most of the participants (50.0%) had been school principals for 5 to 9 years. Participants with 0 to 4 years, 20 to 24 years, and 25 or more years had equal dispersion with 12.5%. From the demographic data relating to number of years that the participant had been a classroom teacher, most of the participants (i.e., 25.0%) had been a classroom teacher for 15 to 19 years. Participants with 0 to 4 years and 20 to 24 years had equal dispersion with 20.0%. Similarly, participants with 5 to 9 years and 10 to 14 years had equal dispersion with 15.0%. Participants with 25 or more years of experience had the smallest representation (i.e., 5.0%). Table 14 displays the frequencies and percentages for years in role by group.

Table 14

Frequencies and Percentages for Years in Role by Group

	School Principal		Teacher	
Range of Years	*n*	%	*n*	%
0 to 4 years	1	12.5	4	20.0
5 to 9 years	4	50.0	3	15.0
10 to 14 years	0	0.0	3	15.0
15 to 19 years	0	0.0	5	25.0
20 to 24 years	1	12.5	4	20.0
25 or more years	1	12.5	1	5.0
Missing	1	12.5	0	0.0
Total	8	100.0	20	100.0

Most of the principal participants who completed the demographic area of the survey had more than 15 years of experience in education. The data revealed that 37.5% of the participants had 15 to 19 years of experience in education. Participants with 20 to 24 years and 25 or more years had equal dispersion with 25.0%. Contrastly, the years of experience in education among the teacher participants were more diverse. The responses indicated that 35% of the participants had 15 to 19 years of experience in education. The next widely held range was 5 to 9 years of experience (i.e., 20.0%). Participants with 10 to 14 years and 20 to 24 years had equal dispersion with 15.0%. The responses indicated that 10.0% of teacher participants had 0 to 4 years of experience and 5.0% had 25 or more years of experience in education. Table 15 displays the frequencies and percentages for years of experience in education by group.

Table 15

Frequencies and Percentages for Years of Experience in Education by Group

	School Principal		Teacher	
Range of Years	*n*	%	*n*	%
0 to 4 years	0	0.0	2	10.0
5 to 9 years	0	0.0	4	20.0
10 to 14 years	0	0.0	3	15.0
15 to 19 years	3	37.5	7	35.0
20 to 24 years	2	25.0	3	15.0
25 or more years	2	25.0	1	5.0
Missing	1	12.5	0	0.0
Total	8	100.0	20	100.0

Addressing postsecondary courses, approximately five out of seven (i.e., 62.5%) school principal participants had not taken a course within the last 5 years. The remaining two participants (i.e., 25.0%) had taken a postsecondary course within the last five years. Within this group, six (i.e., 75.0%) of the participants earned either an educational specialist degree or doctoral degree. The remaining participants (i.e., 12.5%) earned a master's degree. Within the teacher participant group, nine (i.e., 45.0 %) participants took their last postsecondary course less than a year ago. Six participants (i.e., 30.0 %) had not taken a postsecondary course in more than five years. Five participants (i.e., 25.0%) had taken a postsecondary course within the last 1 to 5 years. Within this group, seven (i.e., 35.0 %) of the participants earned either an educational specialist degree or doctoral degree. The majority of the participants (i.e., 65.0 %) earned a bachelor's or master's degree. Table 16 displays the frequencies and percentages of the last postsecondary course by group. Table 16 displays the frequencies and percentages for educational level by group.

Table 16

Frequencies and Percentages of Last Postsecondary Course by Group

	School Principal		Teacher	
Years	*n*	%	*n*	%
Less than 1 year	1	12.5	9	45.0
1 to 5 years	1	12.5	5	25.0
More than 5 years	5	62.5	6	30.0
Missing	1	12.5	0	0.0
Total	8	100	20	100.0

Table 17

Frequencies and Percentages for Educational Level by Group

	School Principal		Teacher	
Educational Level	*n*	%	*n*	%
Bachelor's Degree	0	0.0	6	30.0
Master's Degree	1	12.5	7	35.0
Educational Specialist	3	37.5	5	25.0
Doctorate	3	37.5	2	10.0
Missing	1	12.5	0	0.0
Total	8	100.0	20	100.0

Specifically related to technology-related courses, the majority (i.e., 75.0%) of the principal participants had not taken a course in the last five years while 12.5% had taken a course in the last 1 to 5 years. Within the teacher participant group, most (i.e., 40.0%) of the teacher participants had not taken a course in the last 5 years. On the contrary, the next widely held range (i.e., 35.0%) of the participants took their last technology course less than one year ago while 25.0% had taken a course in the last 1 to 5 years. Table 18 displays the frequencies and percentages for the last technology course by group.

Table 18

Frequencies and Percentages for Last Technology Course by Group

	School Principal		Teacher	
Years in Role	*n*	%	*n*	%
Less than 1 year	0	0.0	7	35.0
1 to 5 years	1	12.5	5	25.0
More than 5 years	6	75.0	8	40.0
Missing	1	12.5	0	0.0
Total	8	100.0	20	100.0

Findings

A causal-comparative design was used to address the research questions for this study. To gather principals' and teachers' perceptions of instructional leadership behaviors and 21st century knowledge and skills, the researcher utilized the adapted *21st Century Instructional Leadership Inventory* to measure two elements of knowledge, i.e., Teacher Digital Age Learning and Instructional Leader Digital Age Learning. These two elements of knowledge consisted of items using a Likert-type five-point rating scale, which expanded across four sub-dimensions. Dimension 1 (It is Important that School Instructional Leaders) and Dimension 3 (Importance of Teaching Students 21st Century Skills) of the survey instrument measured Teacher Digital Age Learning. The responses ranged from *Strongly Disagree* to *Strongly Agree* (i.e., Dimension 1) and *Unimportant* to *Very Important* (i.e., Dimension 3). Dimension 2 (As a School-level Instructional Leader) and Dimension 4 (Assess Your Knowledge of 21st Century Skills) of the survey instrument measured Instructional Leader Digital Age Learning. The responses ranged from *Strongly Disagree* to *Strongly Agree* (i.e., Dimension 2) and *Very Limited or No*

Knowledge to *Very High Knowledge* or *Expert* (i.e., Dimension 4). This section describes in detail the findings for each research question.

Research Question 1

1) What is the difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory?*

Descriptive analysis of Dimension 1. Dimension 1 (It is Important that School Instructional Leaders) consisted of eight items, which focused upon what instructional leaders know about the skills and classroom instructional practices and processes that are part of the 21st century classroom by examining the importance of instructional leader practices, such as modeling effective classroom management, coaching teachers' use of collaborative learning networks, and promoting and participating in national learning communities (Arrington, 2014). For school principal participants (n = 8), the mean response for Dimension 1 (It is Important that School Instructional Leaders) was 3.86 with a standard deviation of 0.68. For teacher participants (n = 20), the mean response for items in Dimension 1 (It is Important that School Instructional Leaders) was 4.07 with a standard deviation of 0.67.

Descriptive analysis of Dimension 3. Dimension 3 (Importance of Teaching Students 21st Century Skills) consisted of 12 items, which also focused upon what instructional leaders know about the skills and classroom instructional practices and processes that are part of the 21st century classroom. The dimension examined knowledge questions that were related to the importance of teaching 21st century skills, such as using assessments to inform learning and teaching, the incorporation of digital

tools to promote student creativity, aligning assessments and standards, customizing and personalizing learning, and using digital tools to address students' diverse learning styles (Arrington, 2014). For school principal participants (n = 8), the mean response for Dimension 3 (Importance of Teaching Students 21st Century Skills) was 4.21 with a standard deviation of 0.46. For teacher participants (n = 20), the mean response for items in Dimension 3 (Importance of Teaching Students 21st Century Skills) was 4.15 with a standard deviation of 0.70. Descriptive statistics for Dimension 1 and Dimension 3 are presented in Table 19.

Table 19

Descriptive Statistics for Dimension 1 and Dimension 3 by Group

	School Principal					Teacher				
Dimension	*n*	*M*	*SD*	*min*	*max*	*n*	*M*	*SD*	*min*	*max*
1	8	3.86	0.68	2.75	5.00	20	4.07	0.67	3.00	5.00
3	8	4.21	0.46	3.36	5.00	20	4.15	0.70	2.67	5.00

Descriptive analysis of Teacher Digital Age Learning. Dimension 1 (It is Important that School Instructional Leaders) and Dimension 3 (Importance of Teaching Students 21st Century Skills) measured Teacher Digital Age Learning. These two dimensions were averaged to create the element. Descriptive statistics, including the means and standard deviations, were conducted for the Teacher Digital Age Learning variable. Notably, principal participants and teacher participants had similar means (see Table 20). This outcome indicated that the perceptions of Teacher Digital Age Learning were similar and will be further discussed in Chapter V. Descriptive statistics for Teacher Digital Age Learning are presented in Table 20.

Table 20

Descriptive Statistics for Teacher Digital Age Learning by Group

	School Principal					Teacher				
Element	*n*	*M*	*SD*	*min*	*max*	*n*	*M*	*SD*	*min*	*max*
Teacher Digital Age Learning	8	4.07	0.50	3.47	5.00	20	4.12	0.62	2.80	5.00

Levene's Test of Equality of Error Variances. Levene's Test of Equality of Error Variances was conducted on the data to determine if the assumption of homogeneity of variance was met. If Levene's $p > .05$, then equal variance could be assumed. The result was not statistically significant ($F = 0.62$; $p = .44$), meaning the assumption of homogeneity of variance was met.

In order to answer Research Question 1 and the corresponding hypotheses, an independent samples *t*-test was conducted to compare the difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning. Analysis of the means revealed that there was no significant difference between K-12 principals' ($M = 4.07$, $SD = 0.50$) and teachers' ($M = 4.12$, $SD = 0.62$) perceptions of Teacher Digital Age Learning as shown by the *21st Century Instructional Leadership Inventory*, $t(26) = -0.20$, $p = .84$. Null Hypothesis One stated there is not a statistically significant difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.* Therefore, the researcher failed to reject the null hypothesis.

Research Question 2

2) What is the difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory?*

Descriptive analysis of Dimension 2. Dimension 2 (As a School-level Instructional Leader) consisted of nine items, which focused on the knowledge that instructional leaders need to lead in the development of the 21st century classroom. The dimension examined knowledge questions that were related to modeling collaborative learning strategies, maximizing teacher and student access to technology-rich environments, collaborating to select digital tools and resources that enhance teaching and learning, and providing learner-centered environments that are equipped with technology (Arrington, 2014). For school principal participants (n = 8), the mean response for Dimension 2 (As a School-level Instructional Leader) was 4.08 with a standard deviation of 0.50. For teacher participants (n = 20), the mean response for items in Dimension 2 (It is Important that School Instructional Leaders) was 4.11 with a standard deviation of 0.57.

Descriptive analysis of Dimension 4. Dimension 4 (Assess Your Knowledge of 21st Century Skills), which consisted of 10 items, asked for the principal participants to self-assess their own knowledge of Instructional Leader Digital Age Learning. This area of the survey was used to identify the adequate skill level that was needed for leading teachers in creating 21st century classrooms. Items included maximizing teacher and student use of digital tools and resources, expanding opportunities for professional development for teachers and administrators, and selecting and evaluating digital tools

and resources. (Arrington, 2014). For school principal participants (n = 8), the mean response for Dimension 4 (Assess Your Knowledge of 21st Century Skills) was 3.30 with a standard deviation of 0.47. Descriptive statistics for Dimension 2 and Dimension 4 are presented in Table 21.

Table 21

Descriptive Statistics for Dimension 2 and Dimension 4 by Group

	School Principal					Teacher				
Dimension	*n*	*M*	*SD*	*min*	*max*	*n*	*M*	*SD*	*min*	*max*
2	8	4.08	0.50	3.44	5.00	20	4.11	0.57	3.11	5.00
4	8	3.30	0.47	2.90	4.00	20				

Descriptive analysis of Instructional Leader Digital Age Learning. Dimension 2 (As a School-level Instructional Leader) and Dimension 4 (Assess Your Knowledge of 21st Century Skills) measured Instructional Leader Digital Age Learning. These two dimensions were averaged to create the element. Descriptive statistics, including the means and standard deviations, were conducted for the Instructional Leader Digital Age Learning variable. Inherently, principal participants had a lower mean than teacher participants (Table 22). This outcome indicated that there was a difference in the perceptions of Instructional Leader Digital Age Learning and will be further discussed in Chapter V. Descriptive statistics for Instructional Leader Digital Age Learning are presented in Table 22.

Table 22

Descriptive Statistics for Instructional Leader Digital Age Learning by Group

	School Principal					Teacher				
Element	*n*	*M*	*SD*	*min*	*max*	*n*	*M*	*SD*	*min*	*max*
Instructional Leader Digital Age Learning	8	3.78	0.37	3.29	4.44	20	4.11	0.57	3.11	5.00

Levene's Test of Equality of Error Variances. The items within the Instructional Leader Digital Age Learning element examined knowledge that school principals need to lead in the development of the 21st century classroom. Levene's Test of Equality of Error Variances was conducted on the data to determine if the assumption of homogeneity of variance was met. If Levene's $p > .05$, then equal variance could be assumed. The result was not statistically significant ($F = 1.69$; $p = .21$), meaning the assumption of homogeneity of variance was met for Instructional Leader Digital Age Learning.

In order to investigate the research question and corresponding hypotheses, an independent samples *t*-test was conducted to compare the difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning. Analysis of the means revealed that there was not a statistically significant difference between K-12 principals' ($M = 3.78$, $SD = 0.37$) and teachers' ($M = 4.11$, $SD = 0.57$) perceptions of Instructional Leader Digital Age Learning as shown by the *21st Century Instructional Leadership Inventory*, $t(26) = -1.52$, $p = .14$. Null Hypothesis Two stated there is not a statistically significant difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st*

Century Instructional Leadership Inventory. Therefore, the researcher failed to reject the null hypothesis.

Summary

Chapter IV provided an overview of the study's findings. The purpose of this quantitative causal-comparative study was to determine if differences existed between principals' and teachers' perceptions of instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. Two research questions and related hypotheses were examined. Independent samples *t*-tests were conducted to compare K-12 principals' and teachers' knowledge of Teacher Digital Age Learning and Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory*. When comparing the two elements, the *t*-test result indicated that there was a statistically significant difference in K-12 principals' and teachers' perceptions of Teacher Digital Age Learning. Further, a statistically significant difference did not exist between the principals' and teachers' perceptions of Instructional Leader Digital Age Learning. Chapter V will provide a synopsis of the total study with specific considerations for the future, including implications and suggestions for further study.

CHAPTER V

DISCUSSION

Summary of the Study

Research (i.e., Clark et al., 1980; Gurley et al., 2015; Hallinger & Heck, 1996; Robinson et al., 2008) supports the crucial role that school principals play in improving the teaching and learning environment in schools. For that reason, leading improved teaching and learning throughout the school should be a top priority in school leaders' leadership repertoire. The excellence and effectiveness of the instruction throughout the school drive the quality of student learning and ultimately determine the success of students (Georgia Department of Education, 2016).

With the growing consumption of technology and shift toward an increase in digital resources, the role of the school principal is paramount in the change of fostering 21st century learning environments and for sustainable technology integration that is necessary for the engagement and success of 21st century digital natives (Arrington, 2014; Shepherd & Taylor, 2019). Researchers (e.g., Beytekin, 2014; Shepherd & Taylor, 2019) asserted that principals should exercise their role as digital instructional leaders for educational technologies to influence students' academic success directly.

As the second decade of the 21st century waned, research on technology and training has focused copiously on preparing teachers to utilize technology in the classroom, rather than on school principals' instructional leadership behaviors, knowledge, and skills that are needed to lead and develop 21st century classrooms, which

nurture technology integration (Shepherd & Taylor, 2019, p. 53). This research study was designed to begin filling in the gap of limited research on school leadership practice.

This causal-comparative study examined principals' and teachers' perceptions of leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. Further, the research study measured principals' and teachers' knowledge of Teacher Digital Age Learning and Instructional Leader Digital Age Learning, as measured by the adapted *21st Century Instructional Leadership Inventory*. Data were collected via a web-based survey instrument and analyzed using a series of independent samples *t*-tests to determine whether statistically significant differences existed between school principals' and teachers' perceptions. The study's sample consisted of eight K-12 school principals and 20 teachers from 12 elementary, middle, and high schools in the selected district.

Analysis of the Findings

A deeper understanding of knowledge that is held by school principals regarding 21st century skills and classroom practices as they lead teachers to cultivate 21st century classrooms was gained from the data analyzed in this study. For this study, the researcher used an adapted form of Arrington's (2014) *21st Century District Level Instructional Leadership Inventory* to gather principals' and teachers' perceived instructional leadership behaviors, knowledge, and skills that are needed to develop and lead 21st century classrooms and instructional practices, which support technology integration. Arrington's instrument was developed through a comprehensive review of the literature and ISTE's educational technology standards.

To gather principals' and teachers' perceptions of instructional leadership behaviors and 21st century knowledge and skills, the current researcher identified two elements of knowledge (i.e., Teacher Digital Age Learning and Instructional Leader Digital Age Learning) to use from Arrington's instrument. When comparing the two elements, the *t*-test result reflected that there was not a significant difference in K-12 principals' and teachers' perceptions of Teacher Digital Age Learning. Therefore, the researcher failed to reject the null hypothesis. Further, a statistically significant difference did not exist between the principals' and teachers' perceptions of Instructional Leader Digital Age Learning. Once more, the researcher failed to reject the null hypothesis. A summary of the hypotheses and outcomes are presented in Table 23.

Table 23

Hypotheses Summary and Outcomes

Hypothesis	Significance	Outcome
H_o1: There is not a statistically significant difference between K-12 principals' and teachers' perceptions of Teacher Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*	$p = .84$	Failed to reject the null.
H_o2: There is not a statistically significant difference between K-12 principals' and teachers' perceptions of Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory.*	$p = .14$	Failed to reject the null.

Discussion of Research Findings

The *21st Century Instructional Leadership Inventory* (Arrington, 2014) garnered K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to develop 21st century classrooms and instructional practices, which support technology integration. Two elements of knowledge, i.e., Teacher Digital Age Learning and Instructional Leader Digital Age Learning, focused

upon what instructional leaders know about the skills and classroom instructional practices and processes that are part of the 21st century classroom and the knowledge that instructional leaders need, but do not yet possess, in order to lead in the development of the 21st century classroom (Arrington, 2014; ISTE, 2011). After comparing the two elements, there was no statistically significant difference in K-12 principals' and teachers' perceptions of Teacher Digital Age Learning. Despite the results of the research study indicating principals had a slightly lower mean for Instructional Leader Digital Age Learning compared to teachers, and the Dimension 4, principals' self-assessment of their knowledge, was much lower relative to the other dimensions, the differences were not statistically significant. Though an overall understanding of the general beliefs of 21st century instruction and classroom practices was evident, the data suggested that principals lacked the leadership skills in cultivating and leading 21st century classrooms in a digital learning environment.

Teacher Digital Age Learning. The Teacher Digital Age Learning Element encompassed two dimensions, i.e., It is Important that School Instructional Leaders and the Importance of Teaching 21st Century Skills. Collectively, these two dimensions harnessed the skills and knowledge that principals and teachers need to support digital-age learning environments (Arrington, 2014; ISTE, 2011). Among the different items within this element, items, such as using assessments to inform learning and teaching, the incorporation of digital tools to promote student creativity, aligning assessments and standards, customizing and personalizing learning, and using digital tools to address students' diverse learning styles, were measured. While notably, principal participants and teacher participants had similar means, but the analysis of the means revealed no

statistically significant difference between principals' (M = 4.07, SD = 0.50) and teachers' (M = 4.12, SD = 0.62) perceptions of Teacher Digital Age Learning as shown by the *21st Century Instructional Leadership Inventory.* The results suggested that K-12 principals and teachers were not significantly different in their understanding of the support and pedagogical practices that are needed to cultivate and sustain 21st century classrooms.

The research has been pervasive in recognizing that achieving 21st century outcomes require educational leaders and teachers to reconsider what and how students learn. Ugur and Koc (2019) noted that, for the sustainable integration of technology necessary for the engagement and success of 21st century digital natives, school principals and teachers should acknowledge the technology paradigm shift that is needed to transform 21st century instructional practices utilizing technology. Schrum and Levin (2013) described schools where technology had been fully integrated. In these schools, students tracked their own progress, and teachers created common assessments across disciplines and grade levels. Their study supported that technology use needs to be connected to student learning, includes hands-on use of technology in a variety of learning experiences, provides curriculum specific applications, and has administrative support with adequate resources (Schrum & Levin, 2013). In digital-age learning cultures, teachers are able to motivate a new and different type of learner. Learning opportunities are no longer restricted within the walls of the classroom, rather learning is personal and engaging (Larson et al., 2010).

Instructional Leader Digital Age Learning. The Instructional Leader Digital Age Learning element encompassed two dimensions, i.e., As a School Instructional

Leader and Assess Your Knowledge of 21st Century Skills. Collectively, these two dimensions measured the knowledge that instructional leaders need to lead in the development of the 21st century classroom (Arrington, 2014; ISTE, 2011). Among the different items within Element 2, Instructional Leader Digital Age Learning, items, such as maximizing teacher and student access to technology-rich environments, collaborating to select digital tools and resources that enhance teaching and learning, providing learner-centered environments that are equipped with technology, and learning and promoting and participating in local learning communities, were measured. Analysis of the means did not reveal a statistically significant difference between K-12 principals' (M = 3.78, SD = 0.37) and teachers' (M = 4.11, SD = 0.57) perceptions of Instructional Leader Digital Age Learning as shown by the *21st Century Instructional Leadership Inventory.*

Noteworthy, Dimension 4, consisting of 10 items, asked the principal participants to self-assess their own knowledge of Instructional Leader Digital Age Learning. This area of the survey was used to identify the adequate skill level that was needed for leading teachers in creating 21st century classrooms. The mean response (M = 3.30, SD = 0.47) of this dimension was lower than the other three dimensions. Findings suggested that Element 2, Instructional Leader Digital Age Learning, could be identified as an area that principals lacked sufficient knowledge.

A gap exists between what principals recognize about the skills and classroom instructional practices that are part of the 21st century classroom and the knowledge that principals need in order to lead in the development of the 21st century classroom. Similar to Arrington's (2014) observation, this insight is referred to as a knowing-doing gap.

Teachers turn to their district and school leaders to provide the knowledge, training, and direction to close that gap.

Based on the literature presented in Chapter II, school principals are critical for change and sustainability for effective instructional practices. Dawson and Rakes' (2003) study suggested, "As principals become more adept at guiding technology integration, more efficient and effective technology use should become prevalent in schools" (p. 43). Based on the data from Shepherd and Taylor's (2019) study, administrators leading within a digital school environment should reflect on their current knowledge and confidence to act as digital instructional leaders, as both perceived knowledge and perceived confidence are important.

Schrum et al. (2011) expanded the scholarly base on school technology leadership through their examination of the status of administrator preparation programs in providing the leadership that was necessary to facilitate technology use and understand the perspectives of administrators leading their schools in the 21st century. Data that were gathered in this study suggested that individual states were not demanding their current or future administrators have expertise in understanding or promoting the instructional uses of technology. Although the sample of the participants was small (n = 8), the majority (i.e., 75.0%) of the principal participants in the current study had not taken a course in the last five years while 12.5% had taken a course in the last 1 to 5 years.

Connection of analysis to conceptual framework. Fullan's (2014) *Three Keys of Leadership* (i.e., leading the learning, being a district and system player, and becoming a change agent) was the conceptual framework that served as the lens for examining school leadership. The findings from this study encapsulated the basis of the conceptual

framework for the study and suggested that the principal is the pivotal change agent and could lead the efforts in the process of leading teachers in the progression of student learning. Fullan (2014) provided detailed information regarding how principals could support and facilitate this work as leading the learning. Teachers who work together to improve instruction could have a greater impact on student learning. The principal is central to this purposeful work and could lead the efforts in the process of establishing instructional practices to address learning needs and providing opportunities for teachers to meet and collaborate. As system players, principals should take into account the bigger picture and interact with others to build a network of learning. As a final point, Fullan described principals as serving as change agents. The principal creates ownership, capacity, and sustainability (Costa, 2016; Fullan, 2014).

Limitations of the Study

The research study was conducted in the state of Georgia within a single school district. Therefore, the results were singular to the perceptions of principals and teachers in one school district and did not necessarily represent the perceptions of principals and teachers in the state of Georgia. Further, the researcher was an entrusted educator within the school district; hence, the researcher's association to the study may be identified as a limitation. Additionally, the revised guidelines to conduct research imposed conditions to include a permitted subgroup of elementary, middle, and high schools, which the research could be conducted. Consequently, the sample size (n = 28) served as a limitation for the study. Moreover, the school principals serving within seven of the schools chose to issue the recruitment email to teachers to elicit involvement. The receipt of an email from the teachers' respective school leader could have influenced teacher involvement.

The chosen causal comparative research design for the study also posed limitations. This research design lacked random assignment and did not allow for the manipulation of the independent variables. Without random assignment, the results could not be generalized to the general population (Salkind, 2010). The demographic items could limit the generalizability of the findings. Most of the principal participants (i.e., 87.5 %) who completed the demographic area of the survey had more than 15 years of experience in education. For that reason, the years of experience could be another limitation of the study.

Finally, unprecedented times posed another research limitation. In response to the spread of the coronavirus (COVID-19) pandemic, governors and legislatures called for the statewide closure of public schools in the spring of 2020 (Education Week, 2020). This paradigm shift forced districts to shift quickly from face-to-face interactions to remote learning, thrusting educators to learn new technologies and school administrators to lead in challenging times (Kurtz, 2020). As such, the participants' reactions to the pandemic could have impacted their survey responses.

Recommendations for Future Research

This quantitative study was designed to examine K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. A similar study including building-level assistant principals could allow for a broader comparative analysis of those school-based administrators who lead teachers directly as they cultivate 21st century classrooms.

Comparable to Arrington's study (2014), this study identified self-assessment knowledge of instructional leader digital learning as an area where knowledge was lacking for school principals. A focused study employing a qualitative methodology could allow for a deeper exploration of the overall inadequate knowledge to lead this shift to 21st century classrooms and instruction.

While this study contributed to filling in the gap of limited research on school leadership practice, the research should not conclude with this study. Expanding the research to include a broader range of elementary and secondary organizations beyond the single organization that this study was based upon could be a future research option.

Implications of the Study

The practical significance of this study was to bridge the gap of examining principals' technology leadership role and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. As indicated in the Statement of the Problem, less research existed on the extent of principals' beliefs about technology use as an integral part of K-12 education and how their leadership role could influence pedagogical conditions and student outcomes positively (Alghamdi & Prestridge, 2015). The overall academic implications of this research study embodied a contribution to the dearth of existing literature regarding the impact of school principal's role toward leadership effectiveness with regard to technology integration.

Despite the results of the research study indicating principals had a slightly lower mean for Instructional Leader Digital Age Learning compared to teachers, the analysis of data revealed that no statistically significant difference was found between K-12

principals' and teachers' perceptions of Instructional Leader Digital Age Learning. Specifically related to technology-related courses, the majority (i.e., 75.0%) of the principal participants had not taken a course in the last five years. The specific type of technology-related course was not defined within Arrington's (2014) instrument. The mean for Dimension 4, principals' self-assessment of their knowledge, was lower relative to the other dimensions. These findings suggested that principals indicated an overall lack of knowledge of Instructional Leader Digital Age Learning. The literature (i.e., Dawson & Rakes, 2003; Richardson et al., 2013; Schrum et al., 2011; Shepherd & Taylor, 2019) supported the need for leadership development programs. The researcher desires that the findings of this study provide a basis within the educational arena as it relates to preparing current and future school principals for the role as an instructional leader in a digital age. The study's findings could provide useful data for the district's leadership development program to cultivate strategies that could assist principals in their acquisition of knowledge and skills regarding technology in schools (Kozsolski, 2006). Further, colleges and universities could use the results of this study in course planning to ensure greater technology leadership preparation for future principals.

As a vested educator in the selected district and state, the researcher recognizes the importance of instructional effectiveness to improve student learning outcomes. With a core purpose on student learning, the findings from this study will be shared with the participating district to further support their investment of technology innovations for cultivating 21st century classrooms and, moreover, supporting the district's commitment to ensuring very student has access to a high quality education (Governance Framework, 2019).

Conclusion

The quantitative causal comparative research study sought to examine K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. While school principals are critical to implementing change in schools, a dearth of research existed in the literature that addressed the existence of a relationship between principals' and teachers' perceptions of leadership effectiveness with regard to technology integration. The overarching research question that guided this study was: What is the difference between K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration? The study's research framework was grounded conceptually in the work of Fullan's (2014) *Three Keys of Leadership* for supporting school improvement efforts. Fullan identified three keys to maximizing the principal's impact, which include leading the learning, being a district and system player, and becoming a change agent.

This study contributed to filling in the gap of limited research on school leadership practice. The findings of this study revealed that there was not a statistically significant difference in K-12 principals' and teachers' perceptions of Teacher Digital Age Learning, Further, no statistically significant difference was found in principals' and teachers' of Instructional Leader Digital Age Learning. Specifically, principals could have general knowledge of 21st century classrooms but lack the leadership skills in cultivating and leading 21st century classrooms in a digital learning environment.

Today's principals and teachers face unique challenges that they have never encountered or even imagined by their pioneers. With a global pandemic sweeping the world, pedagogies and leadership practices that are characteristic of education call for a reinvigorated approach to research on educational technologies (Williamson, Eynon, & Potter, 2020). We now need to turn our efforts to developing the *human infrastructure* that can provide all of our students with the digital-age teaching and learning opportunities that will prepare them for college, careers, and citizenship in the rapidly changing, global, and digital world (Hunt, 2016).

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APPENDICES

Appendix A

Survey Instrument: 21st Century Instructional Leadership Inventory

21ST CENTURY INSTRUCTIONAL LEADERSHIP INVENTORY
EXAMINING K-12 PRINCIPALS' LEADERSHIP ROLE AND THEIR BELIEFS TOWARD TECHNOLOGY INTEGRATION IN THE 21st CENTURY CLASSROOM
Informed Consent Form: You are being asked to participate in a research project conducted by Rhonda M. Robinson, a graduate student in the doctoral program at Columbus State University. Dr. Jennifer Brown, Associate Professor of Educational Foundations in the Department of Teacher Education, Leadership, and Counseling, will supervise the study. **Purpose of the Study**: The purpose of this project is to determine if a difference exists between principals' and teachers' perceptions of instructional leadership behaviors and the knowledge and skills that are needed to lead and develop 21st century classrooms and instructional practices, which support technology integration. For this study, the grouping independent variables will be K-12 principals and teachers. The two dependent variables are K-12 principals' and teachers' knowledge of Teacher Digital Age Learning and Instructional Leader Digital Age Learning as measured by the *21st Century Instructional Leadership Inventory*. **Procedures**: An approved subgroup of district principals and K-12 teachers are invited to participate in a 10-15 minute online survey. The researcher will send an invitation to participate email to each principal via their district email account beginning January 2021. The email addresses will be provided by the district's Information Services Division. The email will introduce the researcher and provide an overview of the study. In addition, there will be an anonymous link that the participant can select or copy and paste into his or her Internet browser to access the web-based survey. As the principal, he or she may share the survey information directly with teachers or with written consent, the researcher will directly send the invitation to teachers. Participants will have 4 weeks to complete the survey, which will take 10-15 minutes in duration to complete. There is a possibility the researchers will utilize these data for future research projects. **Possible Risks or Discomfort**: There are no known risks or discomforts associated with this research. **Potential Benefits**: There are not any potential benefits for the individual participants; however, state policy makers and system-level decision makers could use the findings to enhance professional development programs for principals and develop support mechanisms and strategies to assist principals to develop their knowledge and skills that are related

to digital learning. Consequently, principals could procure knowledge and skills needed to lead teachers in developing 21st century classrooms and instructional practices, which support technology integration.

Costs and Compensation:
As an incentive to participate, respondents will have the option to enter their name in a random drawing for a $50 Amazon gift card upon survey completion. The winner will be notified via his or her district email account. The last item on the survey will ask each participant to provide his or her first and last name and email address if he or she is interest in being entered into the random drawing. After the random drawing for the survey incentives, the participants' names and email addresses will be deleted from the dataset.

Confidentiality:
The Qualtrics software creates a Response ID, which will be randomly generated for each participant. The IP address, which derives from the user's computer or network, will be deleted once the raw data are downloaded from the Qualtrics software. After the random drawing for the survey incentives, the participants' names and email addresses will be deleted from the dataset.

The researcher will ensure that the subjects' confidentiality is maintained using a password-protected computer in the PI's office. Only the Principal Investigator and Co-Principal Investigator will have access to the respondents' data. Data that are used for reporting will only be presented in a manner that prevents any identification of individuals or individual responses. Data will be stored in electronic files within a password-protected computer in the PI's office. These files will be permanently deleted from hard-drive storage five years after the publication of the dissertation.

Withdrawal:
Your participation in this research study is voluntary. You may withdraw from completing the study at any time, and your withdrawal will not involve penalty or loss of benefit.

For additional information about this research, you may contact the researcher, Rhonda M. Robinson, @ robinson_rhonda1@columbusstate.edu or my chairperson, Dr. Jennifer Brown, at brown_jennifer2@columbusstate.edu. You may also address any questions or concerns about your rights as a research participant or this study in general to the Columbus State Institutional Review Board at irb@columbusstate.edu.

Consent:
I have read this informed consent form. If I had any questions, they have been answered. By selecting the *I agree* radial and *Submit*, I agree to participate in this research project.

- o I agree to participate.
- o I do not agree to participate.

Submit

21ST CENTURY INSTRUCTIONAL LEADERSHIP INVENTORY
1. What is your role? o School Principal o K-12 Teacher *(Condition: If participant selects teacher, survey will proceed to next question.)*
Please use the following scale to respond to the items below: Scale: DK = Don't Know 1 = Unimportant 2 = Of Little Importance 3 = Moderately Important 4 = Important 5 = Very Important **It is important that a school instructional leader**:

	DK	1	2	3	4	5
2. Models effective classroom management	o	o	o	o	o	o
3. Maintains and manages a variety of digital tools and resources for teacher and student use	o	o	o	o	o	o
4. Coaches teachers in and models use of collaborative learning strategies	o	o	o	o	o	o
5. Troubleshoots basic hardware problems common in digital learning environments	o	o	o	o	o	o

6. Collaborates to evaluate digital tools and resources that enhance teaching and learning	o	o	o	o	o	o
7. Stimulates creativity	o	o	o	o	o	o
8. Facilitates the use of adaptive and assistive technologies to support student learning	o	o	o	o	o	o
9. Promotes and participates in national learning communities	o	o	o	o	o	o

21ST CENTURY INSTRUCTIONAL LEADERSHIP INVENTORY						
Please use the following scale to respond to the items below: Scale: DK = Don't Know 1 = Strongly Disagree 2 = Disagree 3 = Undecided 4 = Agree 5 = Strongly Agree **As a school instructional leader, principals must be able to**:						
	DK	1	2	3	4	5
10. Model collaborative learning strategies	o	o	o	o	o	o
11. Maximize teacher and student access to technology-	o	o	o	o	o	o

rich learning environments						
12. Coach teachers in and model use of online and blended learning	o	o	o	o	o	o
13. Select adaptive and assistive technologies to support student learning	o	o	o	o	o	o
14. Collaborate to select digital tools and resources that enhance teaching and learning	o	o	o	o	o	o
15. Provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners	o	o	o	o	o	o
16. Troubleshoot basic software problems common in digital learning communities	o	o	o	o	o	o
17. Promote and participate in local learning communities	o	o	o	o	o	o
18. Use digital-age communication and	o	o	o	o	o	o

collaboration tools to interact with parents						

21ST CENTURY INSTRUCTIONAL LEADERSHIP INVENTORY						
Please use the following scale to respond to the items below: Scale: DK = Don't Know 1 = Unimportant 2 = Of Little Importance 3 = Moderately Important 4 = Important 5 = Very Important **As it relates to teaching students 21st century skills, how important is it for a teacher to**:						
	DK	1	2	3	4	5
19. Enable students to pursue their individual curiosities	o	o	o	o	o	o
20. Develop technology-enriched learning environments	o	o	o	o	o	o
21. Provide students with multiple and varied formative assessments	o	o	o	o	o	o
22. Align assessments with content standards	o	o	o	o	o	o
23. Use assessment results to inform teaching and learning	o	o	o	o	o	o
24. Customize and personalize	o	o	o	o	o	o

learning activities						
25. Utilize digital tools and resources to address students' diverse learning styles	o	o	o	o	o	o
26. Enable all students to participate in setting their own educational goals	o	o	o	o	o	o
27. Provide students with multiple and varied summative assessments	o	o	o	o	o	o
28. Incorporate digital tools and resources to promote student creativity	o	o	o	o	o	o
29. Align assessments with technology standards	o	o	o	o	o	o
30. Enable all students to assess their own progress	o	o	o	o	o	o

21ST CENTURY INSTRUCTIONAL LEADERSHIP INVENTORY
Please use the following scale to respond to the items below: Scale: 1 = Very Limited or No Knowledge 2 = Limited Knowledge Level

3 = Moderate Knowledge Level
4 = High Knowledge Level
5 = Very High Knowledge Level or Expert

[Principals only] Please assess your own knowledge level of the following topics:

	1	2	3	4	5
31. Maximizing teacher and student use of digital tools and resources	o	o	o	o	o
32. Expanding opportunities and choices for online professional development for teachers.	o	o	o	o	o
33. Troubleshooting basic connectivity problems common in digital learning environments	o	o	o	o	o
34. Selecting and evaluating digital tools and resources compatible with the school technology infrastructure	o	o	o	o	o
35. Using digital communication and collaboration tools to communicate globally	o	o	o	o	o
36. Ensuring effective practice in the	o	o	o	o	o

study of technology and the infusion across the curriculum					
37. Promoting and participating in global learning communities	o	o	o	o	o
38. Evaluating the use of adaptive and assistive technologies to support student learning	o	o	o	o	o
39. Coaching teachers in and modeling use of digital content	o	o	o	o	o
40. Stimulating digital-age collaboration	o	o	o	o	o

21ST CENTURY INSTRUCTIONAL LEADERSHIP INVENTORY
Demographics
41. *Teacher Only*: Select the response that best indicates the content area in which you currently teach. o Elementary teacher o English Language Arts o Math o Science o Social Studies o Career, Technical and Agricultural Education (CTAE) o World Language o Fine Arts o Health and/or P.E. o Exceptional Student Education o Other
42. Select the response that describes your gender. o Male o Female
43. Select the response that best indicates the grade span in which you currently serve as principal or teach.

- Elementary school (grades K–5)
- Middle school (grades 6-8)
- High school (grades 9–12)
- Other (K-12)

44. Select the response that best indicates the number of years you have been in the role of principal or teacher.
    - 0 to 4 years
    - 5 to 9 years
    - 10 to 14 years
    - 15 to 19 years
    - 20 to 24 years
    - 25 or more

45. Select the response that describes your years of experience in education.
    - 0 to 4 years
    - 5 to 9 years
    - 10 to 14 years
    - 15 to 19 years
    - 20 to 24 years
    - 25 or more

46. What is your highest educational level?
    - Bachelor's Degree
    - Master's Degree
    - Leadership endorsement
    - Educational Specialist
    - Doctorate

47. Select the response that best describes how many years ago you took your last postsecondary course?
    - Less than 1 year
    - 1-5 years
    - More than 5 years

48. Select the response that best describes how many years ago you took your last technology-related course?
    - Less than 1 year
    - 1-5 years
    - More than 5 years

If you wish to be entered in a drawing for a $50.00 Amazon gift card, enter your name and email address in the space provided below. The drawing will be held at the end of the data collection process.

First Name and Last Name:
Email Address:

Appendix B

Detailed Table of Elements and Items

Element #	Item #	Item	Type
1 Teacher Digital Age Learning	1	Models effective classroom management	5 Point Scale
	2	Maintains and manages a variety of digital tools and resources for teacher and student use	5 Point Scale
	3	Coaches teachers in and models use of collaborative learning networks	5 Point Scale
	5	Troubleshoots basic hardware problems common in digital learning environments	5 Point Scale
	6	Collaborates to evaluate digital tools and resources that enhance teaching and learning	5 Point Scale
	8	Stimulates creativity	5 Point Scale
	9	Facilitates the use of adaptive and assistive technologies to support student learning	5 Point Scale
	10	Promotes and participates in national learning communities	5 Point Scale
	39	Enable all students to pursue their individual curiosities	5 Point Scale
	40	Develop technology-enriched learning environments	5 Point Scale
	42	Provide students with multiple and varied formative assessments	5 Point Scale
	43	Align assessments with content standards	5 Point Scale
	44	Use assessment results to inform learning and teaching	5 Point Scale
	45	Customize and personalize learning activities	5 Point Scale
	46	Utilize digital tools and resources to address students' diverse learning styles	5 Point Scale
	47	Enable all students to participate in setting their own educational goals	5 Point Scale
	48	Provide students with multiple and varied summative assessments	5 Point Scale
	49	Incorporate digital tools and resources to promote student creativity	5 Point Scale
	50	Align assessments with technology standards	5 Point Scale
	51	Enable all students to assess their own progress	5 Point Scale
	77	Please identify skills that 21st century students, teachers and instructional leaders all three must possess.	Open-ended

	78	Please identify practices that should be present in a 21st century classroom.	Open-ended

Element #	Item #	Item	Type
2 Instructional Leader Digital Age Learning	23	Model collaborative learning strategies	5 Point Scale
	24	Maximize teacher and student access to technology-rich learning environments	5 Point Scale
	25	Coach teachers in and model use of online and blended learning,	5 Point Scale
	27	Select adaptive and assistive technologies to support student learning	5 Point Scale
	28	Collaborate to select digital tools and resources that enhance teaching and learning	5 Point Scale
	30	Provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners	5 Point Scale
	31	Troubleshoot basic software problems common in digital learning environments	5 Point Scale
	33	Promote and participate in local learning communities	5 Point Scale
	35	Use digital-age communication and collaboration tools to interact with parents	5 Point Scale
	52	Maximizing teacher and student use of digital tools and resources	5 Point Scale
	54	Expanding opportunities and choices for online professional development for teachers and	5 Point Scale
	56	Troubleshooting basic connectivity problems common in digital learning environments	5 Point Scale
	57	Selecting and evaluating digital tools and resources compatible with the school technology infrastructure	5 Point Scale
	58	Using digital communication and collaboration tools to communicate globally	5 Point Scale
	59	Ensuring effective practice in the study of technology and its infusion across the curriculum	5 Point Scale
	60	Promoting and participating in global learning communities	5 Point Scale
	62	Evaluating the use of adaptive and assistive technologies to support student learning	5 Point Scale
	63	Coaching teachers in and modeling use of digital content	5 Point Scale
	64	Stimulating digital age collaboration	5 Point Scale
	77	Please identify skills that 21st century students, teachers and instructional leaders all three must possess.	Open-ended
	79	Please identify what instructional leaders must know in order to lead teachers in creating a 21st century classroom and utilizing 21st century instructional practices.	Open-ended

Element #	Item #	Item	Type
3 Digital Citizen Digital Citizenship	68	Exhibiting a positive attitude toward using technology that supports collaboration	5 Point Scale
	69	Advocating for the responsible use of technology and information	5 Point Scale
	70	Practicing safe use of technology and information	5 Point Scale
	72	Advocating for the safe and legal use of technology and information	5 Point Scale
	73	Exhibiting a positive attitude toward using technology that supports learning	5 Point Scale
	74	Demonstrating personal responsibility for lifelong learning	5 Point Scale
	75	Practicing legal and responsible use of technology and information	5 Point Scale
	76	Exhibiting a positive attitude toward using technology that supports productivity	5 Point Scale
	78	Please identify practices that should be present in a 21st century classroom.	Open-ended

Element #	Item #	Item	Type
4 Teacher Digital Citizenship	13	Develops and models cultural understanding by engaging with colleagues and students of other cultures using digital age communication and collaboration tools	5 Point Scale
	14	Understands global societal issues and responsibilities in an evolving digital culture	5 Point Scale
	15	Advocates, models, and teaches safe use of digital information and technology	5 Point Scale
	16	Provides equitable access to appropriate digital tools and resources	5 Point Scale
	17	Develops and models global awareness by engaging with colleagues and students of other cultures using digital age communication and collaboration tools	5 Point Scale
	18	Uses learner-centered strategies	5 Point Scale
	20	Promotes and models digital etiquette related to the use of technology and information	5 Point Scale
	21	Understands local societal issues and responsibilities in an evolving digital culture	5 Point Scale
	22	Advocates, models, and teaches respect for copyright and intellectual property	5 Point Scale
	77	Please identify skills that 21st century students, teachers and instructional leaders all three must possess.	Open-ended
	78	Please identify practices that should be present in a 21st century classroom.	Open-ended

Element #	Item #	Item	Type
5 Instructional Leader Digital Citizenship	4	Models and promote strategies for achieving equitable access to technology-related best practices for all teachers	5 Point Scale
	7	Models and promote diversity	5 Point Scale
	11	Uses digital-age communication and collaboration tools to interact with peers	5 Point Scale
	26	Model and facilitate ethical uses of digital information and technologies	5 Point Scale
	29	Model and promote digital citizenship	5 Point Scale
	32	Model and promote strategies for achieving equitable access to digital tools and resources	5 Point Scale
	36	Model and facilitate understanding of legal issues related to an evolving digital culture	5 Point Scale
	37	Promote, model and establish policies for legal use of digital information and technology	5 Point Scale
	38	Model and facilitate involvement in global issues	5 Point Scale
	53	Using digital age communication and collaboration tools to interact with students	5 Point Scale
	55	Modeling and promoting diversity global awareness	5 Point Scale
	61	Modeling and facilitating understanding of ethical issues related to an evolving digital culture	5 Point Scale
	65	Promoting, modeling and establishing policies for ethical use of digital information and	5 Point Scale
	66	Modeling and facilitating the development of a shared cultural understanding in global issues	5 Point Scale
	67	Using contemporary communication and collaboration tools to develop a shared cultural	5 Point Scale
	77	Please identify skills that 21st century students, teachers and instructional leaders all three must possess.	Open-ended
	79	Please identify what instructional leaders must know in order to lead teachers in creating a 21st century classroom and utilizing 21st century instructional practices.	Open-ended

Element #	Item #	Item	Type
6 Demographic	80	In which Area do you work?	Demographics
	81	What is your current position?	Demographics
	82	How many years has it been since you were last a classroom teacher?	Demographics
	83	How many years were you a classroom teacher?	Demographics
	84	How many years ago did you take your last post-secondary course?	Demographics
	85	How many years ago did you take your last technology related course?	Demographics

Element #	Item #	Item	Type
7 Distractors	12	Models digital fluency through personal tablet use in the community	Distractor
	19	Provides access to personal sites utilized by the community	Distractor
	34	Select appropriate topics for teachers to discuss in learning teams	Distractor
	41	Establish structures to promote conformity of student products	Distractor
	71	Demonstrating commitment to prior beliefs and personal cultural predispositions	Distractor

Appendix C

Permission to Utilize the Survey Instrument

From: Rhonda Robinson [Student] <robinson_rhonda1@columbusstate.edu>
Sent: Sunday, December 29, 2019 11:11 PM
To: jeff.arrington@pac.dodea.edu; jdarring@hotmail.com
Cc: Jennifer Brown <brown_jennifer2@columbusstate.edu>
Subject: Permission to Use Survey Instrument

Good Day Dr. Arrington,

I am a doctoral student at Columbus State University under the direction of my dissertation committee chaired by Dr. Jennifer Brown (brown_jennifer2@columbusstate.edu).

I am seeking your assistance as I study the topic of K-12 principals' leadership role and their beliefs toward technology integration in the 21st century classroom. I am investigating the aforementioned topic as part of my program of study; hence, I would like your permission to potentially use the *21st Century District Level Instructional Leadership* instrument as I seek to further examine the impact of principal leadership styles and the impact on pedagogical practices and student outcomes. I believe you are the copyright owner and can grant this permission, but if that is not correct, please let me know who owns copyright so that I can direct this inquiry to the right person.

Should I pursue this endeavor, I would like to use your survey under the following conditions:

- I will use the surveys only for my research study and will not sell or use it with any compensated activities.
- I will acknowledge the source of the instrument with proper citation and include the copyright statement on all copies of the instrument.

If these are acceptable terms and conditions, please indicate so by replying to me via e-mail: robinson_rhonda1@columbusstate.edu. If you have questions and/or concerns, you may contact me at the aforementioned email and/or my advisor, Dr. Jennifer Brown at brown_jennifer2@columbusstate.edu.Thank you for your time and consideration.

Sincerely,
Rhonda M. Robinson
Doctoral Candidate

-----Original Message-----
From: Arrington, Jeff Dr. CIV OSD/DoDEA-Pacific <Jeff.Arrington@DODEA.EDU>
Sent: Monday, December 30, 2019 12:27 AM
To: Rhonda Robinson [Student] <robinson_rhonda1@columbusstate.edu>; Jennifer Brown <brown_jennifer2@columbusstate.edu>
Cc: jdarring@hotmail.com
Subject: RE: Permission to Use Survey Instrument

Ms. Robinson,

I did create the instrument. Permission granted. May I ask that you share a copy of your dissertation once completed/defended?

Thanks,

Jeff Arrington

Appendix D

CSU IRB Approval Email

From: CSU IRB <irb@columbusstate.edu>
To: "Jennifer L. Brown" <brown_jennifer2@columbusstate.edu>, robinson_rhonda1@columbusstate.edu
Cc: CSU IRB <irb@columbusstate.edu>,
Subject: IRB Application Protocol 21-043 Exempt Approval

Institutional Review Board
Columbus State University

Date: 11/04/2020
Protocol Number: 21-043
Protocol Title: EXAMINING K-12 PRINCIPALS' LEADERSHIP ROLE AND THEIR BELIEFS TOWARD TECHNOLOGY INTEGRATION IN THE 21st CENTURY CLASSROOM

Principal Investigator: Rhonda Robinson
Co-Principal Investigator: Jennifer Brown

Dear Rhonda Robinson,

The Columbus State University Institutional Review Board or representative(s) has reviewed your research proposal identified above. It has been determined that the project is classified as exempt under 45 CFR 46.101(b) of the federal regulations and has been approved. You may begin your research project immediately.

Please note any changes to the protocol must be submitted in writing to the IRB before implementing the change(s). Any adverse events, unexpected problems, and/or incidents that involve risks to participants and/or others must be reported to the Institutional Review Board at irb@columbusstate.edu or (706) 507-8634. If you have further questions, please feel free to contact the IRB.

Sincerely,

Andrew Dorbu, Graduate Assistant

Institutional Review Board
Columbus State University

Appendix E

District IRB Approval

12/7/2020 [redacted]

[redacted] Rhonda Robinson [Student] <robinson_rhonda1@columbusstate.edu>

Research Approval

[redacted] Mon, Dec 7, 2020 at 8:18 AM
To: "robinson_rhonda1@columbusstate.edu" <robinson_rhonda1@columbusstate.edu>

Good morning Ms. Robinson,

The committee approved your research application. Attached is the award letter that includes guidance, parameters and the school(s) that approved your research. I wish you all the best with your research.

If you have any questions, please don't hesitate to reach out.

Best wishes,

[redacted]

[redacted]

[redacted]

[redacted]

Research Application Letter - Robinson.pdf
2171K

Appendix F

Principal Email Inquiry for Survey Distribution

Dear Principal,

I have received approval from the district Research Authorization Committee to proceed with my dissertation research, '***Examining K-12 Principals' Leadership Role and their Beliefs Toward Technology Integration in the 21st Century Classroom***". Thank you for granting me permission to conduct this research project.

On **Friday, January 8, 2021**, you will receive an email from me inviting you to take a brief online survey. The survey should only take you about 10 to 15 minutes to complete. Your participation is greatly appreciated and your contributions may provide valuable feedback to lead teachers in developing 21st century classrooms and instructional practices, which support technology integration.

Since I am also seeking teacher feedback, teachers will also be invited to complete the survey (*Note: the content of the teacher email will mirror the principal email*). As the principal, you may share the survey information directly with your teachers or with your written consent, I can directly send the invitation to your teachers. ***Please indicate with a reply to this email by Thursday, January 7, 2021 noting your preference***:

Option 1: I give you permission to invite teachers to participate in the research survey.

Option 2: I will share the invitation with the teachers.

If I do not receive a response by the aforementioned date, I will accept your preference as Option 2 and will include the teacher invitation in the email you will receive on Friday. If you have any questions, please feel free to contact me at robinson_rhonda1@columbusstate.edu.

Sincerely,

Rhonda Robinson
Doctoral Candidate
Columbus State University

Appendix G

Participant Recruitment Email

Dear Principal or Teacher,

My name is Rhonda Robinson, and I am currently a coordinator in the Division of Information Services. As a graduate student of Columbus State University, I am conducting research as part of the requirements for a doctorate in education (Ed.D). The purpose of my research is to examine K-12 principals' and teachers' perceived instructional leadership behaviors and the knowledge and skills needed to lead and develop 21st century classrooms and instructional practices, which support technology integration.

I am emailing to ask your permission to complete an electronic web-based survey to provide information about your perceptions of what instructional leaders need to know about leading teachers in the development of 21st instructional practices, which support technology integration. If you choose to participate in the survey, your answers will remain confidential, and your identity anonymous. Your identity will not be attached to the survey. The survey should take approximately 10 – 15 minutes to complete. The survey will open on January 8, 2021 and close on February 8, 2021. An incentive will be offered for completion of the survey. All principals and teachers who complete the survey will be eligible for a $50.00 Amazon gift card.

If you have any questions or comments about this survey, please feel free to contact me at robinson_rhonda1@columbusstate.edu or my chairperson, Dr. Jennifer Brown, at brown_jennifer2@columbusstate.edu. Thank you in advance for your time and participation.

Click here to access the informed consent and survey website.

Sincerely,

Rhonda Robinson
Doctoral Candidate
Columbus State University