

THE RELATIONSHIP BETWEEN DIGITAL LEADERSHIP AND
DIGITAL IMPLEMENTATION IN ELEMENTARY SCHOOLS

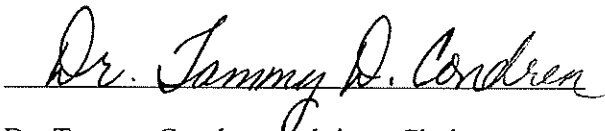
JAMI DOMENY

2017

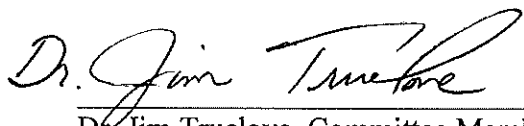
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DIGITAL IMPLEMENTATION IN ELEMENTARY SCHOOLS

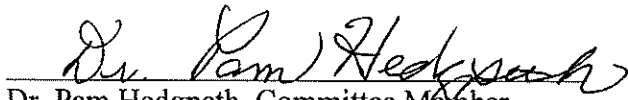
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DIGITAL IMPLEMENTATION IN ELEMENTARY SCHOOLS

A Dissertation
Presented to
The Faculty of the Graduate Education Department
Southwest Baptist University

In Partial Fulfillment
of the Requirements for the Degree

Doctor of Education

By

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Abstract

New technological advances are changing the landscape for both teaching and learning at a rapid pace. With an increase in the focus and allocation of funding on technology, schools need leaders who can facilitate the change process and support a digital learning culture for technology integration. As with any focus and initiative in education, the support and leadership of the principal is crucial (Fullen, 2007). According to Sheninger (2014), leaders must understand that today's learners are wired differently, as a result of the influence of technology in their lives outside of school. With endless possibilities and the world at their fingertips, today's students need teachers and administrators to reimagine the role of technology in the classroom (Blair, 2012). There is a gap between the current school culture and leadership style and the digital culture and digital leadership style that needs to be addressed in order to support the next generation of learners. Digital leadership is a new construction of leadership that connects leaders with technology. In fact digital leadership is not only the use of technology, but also a strategic view of school culture that focuses on engagement and achievement (Askal, 2015). Creating a digital culture to support the needs of today's learners begins with the school leader.

This quantitative descriptive study was designed to determine the impact that a principal's digital leadership has on the teachers' digital implementation in the school. The purpose of this study was to determine the level of significance between the principals' digital leadership and the teachers' level of self-efficacy for modeling twenty-first century skills. The ISTE Standards for Administrators and the ISTE Standards for Teachers were foundational elements in this study; therefore, the researcher selected established instruments with strong alignment to these standards. The administrator

survey tool used for this study was the *Principals' Technology Leadership Assessment* and the teacher survey tool used for this study was the *Educator Technology Self-Efficacy Survey*. Participants in this study were elementary principals and teachers from the state of Missouri.

Results indicated that there was no significance found between principals' digital leadership and teachers' digital implementation, and the correlation between the two variables was weak. Strong relationships were found between each of the individual ISTE Standards for Administrators and the overall ISTE Standards for Administrators, suggesting that the International Society for Technology in Education has the right standards in place to guide and direct principals in their role as digital leaders. Likewise, there were strong relationships found between the individual ISTE Standards for Teachers and the ISTE Standards for Teachers as a whole, which suggested that the International Society for Technology in Education also has the right standards in place to guide and direct teachers in using technology to support teaching and learning. In this study, the demographics of age and years of experience were also analyzed. More important for principals than age or years of experience is their ability to lead in a transformational way. This study was grounded in the theory of transformational leadership, specifically focusing on technology integration and innovation. Principals who have a transformational leadership style empower their teachers and generate a school climate that supports innovation (Sagnak, Kurucz, Polat & Soyulu, 2015). The findings of this study support the need for principals to bridge the gap between teachers with less experience and veteran teachers. In order to do so, it is important for transformational leaders to create a safe environment, one where the staff are inspired and

feel empowered to be innovative (Mehdinezhad, 2016). As technology integration will continue to expand, it is critical for principals to be aware of their role as digital and transformational leaders along with their influence in supporting an innovative culture for their staff, students, parents, and community.

Chapter I

Digital Leadership and Digital Culture

Introduction

New technological advances are changing the landscape for both teaching and learning at a rapid pace. In the ideal teaching and learning setting, the integration of technology should allow students to make use of new technologies as easily as they would other educational tools, such as pencils or books (Cakir, 2012; Arokiasamy, 2014). In 2015, it was expected that instructional technology spending in the United States K-12 schools would increase to approximately \$4.7 billion (McCandless, 2015). With an increase in the focus and allocation of funding on technology, schools need leaders who can facilitate the change process and support a digital learning culture for technology integration.

There is a gap between the current school culture and leadership style and the digital culture and digital leadership style that needs to be addressed in order to support the next generation of learners. School leaders today are experiencing this gap in knowledge and application as they navigate how to lead the digital developments and diffuse these practices into school learning environments (Askal, 2015). In 2015, a study was conducted in which principals were examined as digital leaders in school culture. The findings showed that 93% of principals in the study reported that they have awareness of digital leadership, which indicates their awareness of movement toward digital leadership in the digital age. However, almost all participants reported that they have limited opportunities to implement digital leadership, due to lack of training and technological infrastructure, to use technology in support of learning and school improvement (Askal, 2015).

School leaders are key factors in the implementation of instructional technology in schools. Therefore, leaders must understand the capacities of new technology, have personal proficiency in their own use, and be able to promote a school culture that encourages exploration of new techniques in teaching and learning (Schiller, 2003). A study done in 2011 in Taiwanese elementary schools revealed that principals' technological leadership improves teachers' technological literacy and directly encourages teachers to integrate technology into their teaching (Chang, 2011). In addition, Chang (2011) found that principals' technological leadership makes teachers more effective.

According to Sheninger (2014), leaders must understand that today's learners are wired differently, a direct result of technology's influence in their lives outside of school. In the real world, students are encouraged to take risks and be problem solvers. The traditional teaching style within our schools does not match the learning styles of the active, digital learner. Traditional educators prefer a slow and controlled release of information, while digital learners prefer access to information quickly from multiple media sources. Traditional educators prefer single tasks and linear processing, while digital learners prefer parallel processing and multi-tasking. Educators may prefer students to work independently until mastery before they network and interact, while digital learners prefer to network simultaneously with others throughout the learning process. Traditional educators prefer to teach with text before providing experiences with pictures, sound, and video, while digital learners prefer processing pictures, sounds, color, and video before text. Many educators feel compelled to teach memorization of the

content, while digital learners prefer learning that is relevant, active, instantly useful, and fun (Sheninger, 2014).

There is an ever-growing gap between the world that our students live in and the learning culture within our schools. Because of this disconnect, many students are bored within the classroom. Their environment outside of school is much more engaging, fast-paced, challenging, and meaningful. Today's learners crave choices and want to be connected. When they discover something new, they are excited to share it with their friends. They embrace using digital devices and social media tools; this is how they want their educational experience to be as well (Sheninger, 2014). A new skillset is needed for students to be successful in the age of globalization. Students' acquisition of twenty-first century skills is essential for society's social and economic growth. According to Piaget, the primary goal of education is to create a generation of students who are capable of doing new things, not simply repeating what other generations have done (Garner, 2014). Educators and administrators are facing a challenge today unlike any before, as they are responsible for fostering and developing students' twenty-first century skills that will be needed for a twenty-first century era in a global society (McLachlan, 2012). The Partnership for 21st Century Skills, a national organization advocating for 21st century readiness for every student, has established learning outcomes as a transformation fusing the three R's (reading, writing, and arithmetic) with the four C's: critical thinking, creativity, communication, and collaboration (Blair, 2012).

In order to develop the aforementioned twenty-first century skills, schools and districts across the county are purchasing additional technology resources to support classroom instruction. Yet the purchase of additional devices alone will not transform

education; what teachers are doing to adapt and change their instructional practices is just as critical. As with any initiative in education, the support and leadership of the principal is necessary (Fullen, 2007). With endless possibilities and access to information at their fingertips, today's students need teachers and administrators to reimagine the role of technology in the classroom (Blair, 2012). There is also a new connection between instruction and technology that creates high expectations for today's learners to be engaged. This engagement demands a transformation of teaching and learning to support twenty-first century skills and technology integration. The complex task of cultivating a digital culture that integrates technology to enhance teaching and learning falls on today's school leaders (Metcalf, 2012).

The first step to creating a digital culture is to acknowledge these changes. School leaders must develop a vision and strategic plan for creating a learning culture that provides access to tools that foster twenty-first century skills, celebrates success, supports innovation, and inspires students to learn and achieve. This shift begins with digital leadership of the principal (Sheninger, 2014). Digital leadership is a new construction of leadership that connects leaders with technology. In fact, digital leadership is not only the use of technology, but also the strategic view of school culture that focuses on engagement and achievement (Askal, 2015). Creating a digital culture to support the needs of today's learners begins with the school leader.

Conceptual Underpinnings for the Study

The theoretical framework for this study is grounded in the principles of transformational leadership and followership theory, as well as effective digital leadership. Defined by Bass and Avolio (1994), transformational leadership is leadership

that creates an organizational vision that goes beyond existing systems and practices. Eliophotou-Menon (2016) found that transformational leaders take risks in order to encourage change and innovation. The conceptual underpinnings of transformational leadership and followership theory are appropriate for this study, specifically due to the close connection to innovation and change. In order for schools to make the shifts necessary to create a 21st century learning environment with a strong digital culture, there is a need for a digital leader with a clear vision and teachers who are willing to follow that leader. Transformational leaders support and motivate followers, so that the followers achieve goals and create an organizational climate that respects individual needs and creates a culture of collaboration toward the achievement of common goals (Eliophotou-Menon, 2016).

Research into transformational leadership theory began as early as 1978 by James McGregor Burns, who is considered the founder of modern leadership theory. Burns defined a transformational leader as one who looks for potential motives in followers, seeks to satisfy higher needs, and engages the full person of the follower (Denmark, 2016). While the origins of transformational leadership theory were rooted in political leadership, other researchers began to explore this leadership theory in relation to education. In 1994 Bass and Avolio, along with Leithwood, developed a transformational leadership model for education. The primary focus of this model was the school principal (Denmark, 2016). Leithwood (1994) went on to further study transformational leadership with Begley and Cousins (1994), finding that transformational leadership implies major changes in the form, nature, function and/or potential of a phenomenon as it applies to leadership (Denmark, 2016). Research into transformational leadership theory continued

when Bass (1998) determined that transformational leaders are judged by their impact on followers in the areas of trust, admiration, and respect (Denmark, 2016).

Yukl (1998), as well as Avolio and Bass (1988), found that transformational leaders inspire loyalty, encourage followers to express their ideas and opinions, and make followers proud to be associated with them (Ho, 2016). Additionally, Yukl (1998) and Hater and Bass (1988) found that by building followers' self-efficacy and self-esteem, transformational leaders have a strong, positive influence over time on followers' motivation and goal achievement (Ho, 2016). In Leithwood's (1994) further studies, seven characteristics of transformational leaders were identified. These include building a school vision and establishing goals, creating a productive school culture, providing individualized support, modeling best practices and important organizational values, demonstrating high performance expectations, and developing structures to foster participation in school decisions (Denmark, 2016).

Brown (2003) defines the role of leaders and followership in the digital age. According to Brown, leaders are those who define the present and future for others, that the followers may perceive the future through the lens of the leaders. Leadership is expanding to accommodate changes in the nature of followership, or the willingness of people to follow. Technology levels the playing field between leaders and followers. In the past, leaders were the ones who possessed the answers for their followers. Yet with the Internet and the ability for individuals to access information, followers now find themselves with answers. Technology precipitates the need for the self-directed learner. Therefore, in the information age, leaders must work hard to earn the respect of their followers to be effective (Brown, 2003).

Transformational leadership is necessary for advancing the digital culture in schools because it causes essential change, resolves major concerns, and creates new paradigms (Banerji & Krishnan, 2000; Arokiasamy, Abdullah & Ismail, 2014). Arokiasamy et al. (2014) found that the major effect of transformational leadership is that it inspires and motivates followers, gains follower commitment, changes attitudes, and supports the goals of the individual and organization—all of which are needed for a digital leader to shift a school in developing a digital culture. Experts (Yukl, 1994; Leithwood, 1994) have concurred that practices of transformational leadership contribute to the implementation of innovations in schools (Leng, 2008). Arokiasamy et al. (2014) concluded that transformational leadership is one of the most important factors affecting the integration of educational technology. Transformational leadership promotes the integration of educational technology (Brooks-Young, 2002; Ross, McGraw & Burdette, 2001) to create and sustain a digital culture. In order to be an effective transformational digital leader, principals must simply be effective leaders.

Researchers (Bennett, 1996; Fullan, 1993) have identified effective leadership as a key ingredient of, and vitally important to, the success of any innovation in education (Arokiasamy et al., 2014). Marzano (2005) determined that principal leadership can have a positive impact on the success of an initiative. In 1998, Rieber and Welliver brought to light that effective leadership is needed to enhance the transformation of our education system by leveraging the potential that technology brings (Arokiasamy et al., 2014). Sincar (2013) found that the level of technology leadership highly reflects the quality of leadership in school. In essence, being a strong technology leader is associated with high quality school leadership (Sincar, 2013).

Problem Statement

Currently, educators exist in a time of national emphasis on standards-based accountability and the investment in purchasing and implementing technology. Studies in this area have been done, but the results seem to be inconclusive. Whitehead, Jensen, & Boschee (2013) have determined that the integration of technology has not yielded the anticipated outcomes in student achievement. In contrast, other researchers have concluded that the relationship between technology and student achievement is too complex to show a correlative relationship (Gosmire & Grady, 2007). Protheroe (2005) brought to light that teachers are changing instruction, students are more engaged, and students have a more positive attitude toward learning when technology is present in the classroom (Gosmire & Grady, 2007).

As the potential for technology expands, the principal must know his or her role as an instructional technology leader in order to move the school in the direction of the future. Hope and Stakenas (1999) suggest three primary roles for the principal as a technology leader: role model, instructional leader, and visionary. Principals are responsible for the instructional leadership in their building by facilitating teachers' integration of technology in the classroom. In 2005, Anderson and Dexter found that the active involvement of a key administrator was a factor of success in implementing technology in the teaching and learning process (Gosmire & Grady, 2007).

While there are studies on the topic of technology integration, there exists a lack of research on the role of digital leadership in creating a digital culture. In 2012, Richardson, Bathon, Flora, and Lewis published an NETS-A review of all published literature between 1997 and 2012 on the topic of school technology leadership. After

analyzing the Educational Resource Information Center (ERIC) database and analyzing the findings framed around the NETS-A, only 37 articles had any focus on technology leadership, as defined by the NETS-A. Additionally, nearly 68% of the articles were simply descriptive in nature (Richardson et al., 2012). The findings from this review show an apparent lack of in-depth research on this topic. Richardson et al. (2012) recognized the need for more scholarly studies on topics related to technology standards for school leaders. This study adds to the body of research by focusing on digital leadership and digital culture, as outlined by the International Society for Technology in Education Standards.

Not only is the research on digital leadership and digital culture lacking, but also the skills of those leading the change. As previously discussed, the world we live in is evolving at a rapid rate as technology advances. Yet, currently, there is a gap in the skills of principals leading such digital change in our schools. Many leaders do not have the necessary knowledge or skills to lead the change, especially at the pace at which technology is developed and integrated in schools. School leaders should take on new responsibilities that diverge from traditional ones as they use technology more effectively. As technology continues to dominate our culture, the need for school leaders to adapt to technological developments is imperative. School leaders need to develop themselves as digital leaders in order to lead their teachers and students into a new technological era (Unal, 2015). Therefore, it is necessary to study the digital leadership of a principal and the relationship this has with the technology used by teachers. In essence, there is a gap between the digital world and the current leadership culture in schools.

Purpose for the Study

The purpose of this study is to examine the role that principals' digital leadership plays on the digital culture, as outlined by the ISTE Standards for Administrators and Teachers (2009). A review of the literature reveals a number of studies (Dexter, 2011; Cakir, 2012; Chang, 2012; Richardson et al., 2012; Sincar, 2013; Arokiasamy et al., 2014) that show the importance of the principal as a transformational instructional leader, especially in digital age learning. Metcalf (2012) conducted a study to analyze K-12 principals' perceptions of their technology leadership preparedness. This study used the 2009 NETS-A, or National Education Technology Standards for Administrators, framework to determine leaders' perceptions of their ability to create a technology rich digital culture. While prior studies have used the 2002 NETS-A standards, Metcalf's study utilized the updated 2009 NETS-A framework. As previously addressed, the name of the NETS-A framework was updated to the ISTE Standards for Administrators, while the actual standards for administrators remained the same as the NETS-A in 2009.

Based on the findings in Metcalf's study, recommendations were made for further research in this field. This study will add to the body of research by focusing on the principals' digital leadership, as compared to the digital culture in his or her school building. According to Niekerk (2014), many researchers argue that technology integration will not succeed unless the principal drives the change process. Therefore, there is a need for research in the area of digital leadership as it relates to technology integration in schools. This study focuses on analyzing the relationship between principals' perceptions of their implementation of the ISTE Standards for Administrators and teachers' perceptions of their implementation of the ISTE Standards for Teachers.

Previous studies did not adequately address whether or not a principal's level of implementation of the ISTE Standards for Administrators has a relationship with his or her teachers' level of implementation of the ISTE Standards for Teachers. This study's intent is to address the possible relationship by including elementary principals and teachers from the state of Missouri.

In order to foster a digital culture and bring schools into the digital age, principals must see themselves as digital leaders. Therefore, analyzing the perceptions of principals' leadership skills in relation to the ISTE Standards for Administrators is crucial. Wildy, Pepper, and Guanzhong (2010) found that professional standards allow for more effective evaluation and provide a framework to compare oneself for further self-evaluation. After all, the goal of having professional standards is to improve professional practice (Richardson et al., 2012). With changes in technology occurring at such a rapid pace, along with the shift in the role of school principals, it is necessary to keep the body of research in this area updated with the most current information. The evidence collected during this study is relevant to twenty-first century educators, administrators, instructional coaches, and technology personnel.

Research Question

This study addressed the following research question and sub-questions:

1. What is the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and the teachers' digital implementation in his or her school building?
2. What is the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and specific areas of digital leadership

(visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship)?

- a. Does the demographic of principals' age have an impact?
 - b. Does the demographic of years of experience in administration have an impact?
3. What is the nature of the relationship between elementary teachers' overall perception of their digital implementation and specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership)?
- a. Does the demographic of teachers' age have an impact?
 - b. Does the demographic of teachers' years of experience in education have an impact?

Statement of Hypotheses

Null hypotheses

1. There is no statistical significance in the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and the teachers' digital implementation in his or her school building.
2. There is no statistical significance in the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and specific areas of digital leadership (visionary leadership, digital age learning

culture, excellence in professional practice, systemic improvement, and digital citizenship).

- a. An elementary principal's overall perception of his or her digital leadership has no statistically significant impact on the specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship) based on demographic of age.
 - b. An elementary principal's overall perception of his or her digital leadership has no statistically significant impact on the specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship) based on demographic of years of experience in administration.
3. There is no statistical significance in the nature of the relationship between the elementary teachers' overall perception of their digital implementation and specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership).
 - a. Elementary teachers' overall perception of their digital implementation has no statistically significant impact on the specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments,

model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership) based on demographic of age.

- b. Elementary teachers' overall perception of their digital implementation has no statistically significant impact on the specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership) based on demographic of years of experience in education.

Limitations, Delimitations, and Assumptions

Limitations

The researcher did not have control of the following factors, although these factors may have affected the results of the study.

1. The number of participants who responded to the online survey.
2. The willingness of school principals to disseminate the online survey to their staff and their interest in participating in the study.
3. The access to technology that participants had available in their classroom, building, and district.

Delimitations

The researcher intentionally imposed the following factors in order to narrow the scope of research.

1. This study only included school districts in the state of Missouri.

2. The study only included elementary principals and elementary teachers.

Assumptions

The following assumptions were made during this study.

1. It was assumed that participants would respond truthfully to survey questions.
2. It was assumed that participants would respond completely to survey questions.

Design Controls

A quantitative descriptive research method was used, as an electronic survey was given to principals and teachers. This survey measured the principals' perception of their degree of implementation of the ISTE Standards for Administrators. In addition, an electronic survey was given to teachers to measure their perception of their degree of implementation of the ISTE Standards for Teachers. Participants included elementary principals and teachers from the state of Missouri. Data from the principal and teacher surveys was analyzed to determine if the null hypotheses were supported.

Certain design controls were able to account for the limitations, delimitations, and assumptions in this study. It was assumed that teachers and principals would respond truthfully to the survey questions. The introduction to the online survey included information about confidentiality of the responses received for this study. By including this information before principals and teachers began the survey, the researcher encouraged participants to answer truthfully. There was also the assumption that participants who took this survey would respond to all questions. The researcher was able to establish that all questions included on the online survey were required in order for the participant to submit the survey. Any incomplete responses to the survey were not included in this study. The researcher intentionally included the population of elementary

principals and teachers in the state of Missouri to narrow the scope of research. However, the results of this study will be generalizable due to the use of common educational standards throughout the United States, known as the Common Core. The Common Core State Standards are a set of college- and career-ready standards adopted in 42 states for kindergarten through twelfth grade in English Language Arts and Mathematics (Common Core State Standards Initiative, 2017). In addition, the results will be generalizable due to the wide variety of technology used in schools throughout Missouri and the United States. While the researcher was able to disseminate this survey to all elementary principals in the state of Missouri, there was a limitation in the willingness of principals to have their staff participate. As this study was open to the elementary principals and teachers of Missouri, the researcher was not able to control the amount of technology available in the schools of teachers and principals who responded. Also out of the researcher's control was the number of participants who chose to partake in the study.

Definition of Key Terms

21st century skills: Twenty-first century skills are the skills that students need to succeed in school, work, and life. They focus on what students can do with knowledge, rather than focus on what units of knowledge they possess (Silva, 2008). The skills defined by ISTE (2007) include creativity and innovation, communication and collaboration, research and information fluency, critical thinking, problem solving and decision-making, digital citizenship, and technology operations and concepts.

ISTE: International Society for Technology in Education is a not-for-profit organization dedicated to supporting the use of information technology to aid in the learning and teaching of K-12 students and teachers (ISTE, 2013).

ISTE Standards: The ISTE Standards, formerly known as the NETS, have served as a roadmap since 1998 for improved learning and teaching. They help measure proficiency and set goals for what students (ISTE Standards-S), teachers (ISTE Standards-T), and administrators (ISTE Standards-A) should know and be able to do with technology in education (ISTE, 2013).

Summary

Chapter one introduced the problem of technology being integrated into the education system and changing the status of leadership to digital leadership. The digital leader has become an agent of change in attempting to develop a digital culture in his or her school. Often, leaders are met with the challenges of limited time, support, and resources. However, there is a need to act in an efficient and effective way in light of the rapid pace in which the global standards for education are changing. Elementary principals and teachers in the state of Missouri will be studied to determine if there is a relationship between the principal's digital leadership and the digital culture in his or her school building, as measured by the ISTE Standards. The data used for analysis will be gathered through an online survey given to principals and teachers.

In chapter two, the themes of visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship will be addressed in a literature review. In chapter three, details of the method will be provided, including the participants, sampling procedure, research setting, and research design. Details of the instrumentation, including the validity and reliability of both the instrument and study, will also be given. In addition, statistical treatment of the data along with rationale for the treatment will be explained. The findings from this study will be

presented in chapter four. Finally, in chapter five a summary of the study will be given, along with implications and recommendations for the continuation of this study in the future.

Chapter II

Review of Literature

Introduction

Educators today have found an increased focus on improving student achievement, which is often done through enormous expenditures on modern technologies such as computers, laptops, tablets, and increasing access to the Internet. Therefore, the chief responsibility of school leaders is to provide supportive conditions to help teachers use technology to support innovative teaching and increased levels of learning (Dexter, 2011). Testerman, Flowers, and Algozzine (2002) found that, “If educational leaders continue to demonstrate developmental lags in their knowledge and technology competence, the expected benefits of innovative technology practices will likely be unrealized” (Schrum, Galizio & Ledesma, 2011). Being a digital leader includes more than incorporating new technologies into the classrooms, more than counting the ratio of laptops to students, and more than attempting to differentiate lesson plans for different learning styles by using various technology tools. Digital leadership requires an outlook that views technology not as a tool for every occasion, but as a tool that when used effectively, will enhance the learning process. At its core, digital leadership is about people—the teachers, administrators, and technology leaders—who embrace and realize the potential of technology to enhance student experiences at all levels (Brown, 2014).

Administrators and teachers alike find success in mastery of a set of professional standards. Professional standards allow for more effective evaluation and provide a framework to compare oneself for further self-evaluation (Richardson et al., 2012). While there are numerous organizations concerned with technology in education, the

International Society for Technology in Education, known as ISTE, is recognized as a leading professional society whose mission is to help prepare students, teachers, and administrators to use technology effectively. As part of ISTE's mission, sets of standards were developed for prekindergarten through twelfth grade students, teachers, administrators, and coaches (Morphew, 2012). The ISTE Standards guide how technology is used to promote, encourage, and foster learning in the digital age.

In 2000, the International Society for Technology in Education published six standards for teachers, known at the time as the NETS-T. The original standards included: Technology Operations and Concepts; Planning and Designing Learning Environments and Experiences; Teaching, Learning, and the Curriculum; Assessment and Evaluation; Productivity and Professional Practice; and Social, Ethical, Legal, and Human Issues (Morphew, 2012). Each of the standards included performance indicators, specific measurable outcomes that assessed the level of teacher competency. "Although the 2000 standards were appropriate at the time they were published and for many years after, a need for updated standards arose to better reflect changes in technology, research, and the global community" (Morphew, 2012, p. 4). During the revision process, a wide array of educators and stakeholders scrutinized and reviewed the standards, resulting in the revised 2008 NETS-T. The International Society for Technology in Education relied on the wisdom of educators from nearly 40 countries to provide feedback in the NETS refresh process. Involving such a wide variety of educators from around the world helped move the standards from being relevant on a national level to being relevant on a global level (Morphew, 2012).

Like the broader framework of standards, the 2008 NETS-T were renamed the ISTE Standards for Teachers. The current ISTE Standards for teachers suggest that all teachers should meet the following standards: Facilitate and inspire student learning and creativity; Design and develop digital age learning experiences and assessments; Model digital age work and learning; Promote and model digital citizenship and responsibility; and Engage in professional growth and leadership (ISTE, 2008b, p. 1-2). The ISTE Standards for Teachers provide direction and specific outcomes for teachers. While the ISTE Standards for Teachers are a roadmap for attaining the competencies and skills needed to effectively use technology in education, there are necessary conditions to effectively leverage technology for learning, known as essential conditions (Morphew, 2012).

The essential conditions outlined by ISTE emphasize the importance of collaboration among school personnel at every level and the larger community to help ensure success with technology integration. The essential conditions include shared vision, empowered leaders, implementation planning, consistent and adequate funding, equitable access, skilled personnel, ongoing professional learning, technical support, curriculum framework, student-centered learning, assessment and evaluation, engaged communities, support policies, and supportive external context (ISTE, 2008a). There is a clear connection between ISTE's essential conditions and the role of the administrator. Cakir (2012) found that according to the ISTE Standards (2009), school administrators should be sources of inspiration and leadership in the implementation of the organization's shared vision and effective integration of technology for personal and

professional development. High quality leaders find it critical to have a clear vision of what they want to achieve and how they want to achieve it (Arokiasamy et al., 2014).

Richardson et al. (2012) reviewed the history of technology standards in the field of educational leadership by highlighting the work of Hancock and Fulwiler (2007). They describe how the National Policy Board for Educational Administration (NPBEA) created the Interstate School Leaders Licensure Consortium (ISLLC) and released the ISLLC Standards for School Administrators in 1996 (Richardson et al., 2012). Hancock and Fulwiler (2007) found that within one year of its release, 41 states adopted the ISLLC Standards (Richardson et al., 2012), which are the standards still used to evaluate principals today. While the ISLLC Standards remained key for educational leaders and leadership preparation programs, there became a need for technology standards for school administrators. There was a need not simply to infuse technology into existing standards, but to create a new set of standards that focused exclusively on the technology needs of school administrators (Richardson et al., 2012). In 2001, the International Society for Technology in Education brought together stakeholders from a variety of principal leadership organizations and led the charge in promoting the idea that knowledge, practice, and specific skills were needed for administrators to be ready to support the appropriate use of technology in schools (Schrum, et al., 2011; Richardson et al., 2012).

This team worked together to create and release the National Education Technology Standards for Administrators (NETS-A) in 2001. As the role of technology increased in schools, ISTE updated the NETS-A in 2009 (Schrum, et al., 2011; Richardson et al., 2012). In 2014, the NETS-A were renamed the ISTE Standards for Administrators. While the name of the standards changed, the actual standards for

administrators remained the same as the NETS-A in 2009. The ISTE Standards for Administrators are used to evaluate the skills and knowledge school administrators and leaders need to support digital age learning, implement technology, and transform the education landscape. The task of transforming schools into places of digital age learning requires leadership from administrators who can accept challenges, embrace new opportunities, and lead their staff in educating our future. At this digital turning point in education, the success of technology integration depends on leaders who can implement systemic reform and change the landscape of our schools (ISTE, 2014). The ISTE Standards for Administrators were used as the pillars and foundation for the review of all literature related to this study. The ISTE Standards for Administrators are comprised of the following (ISTE, 2014): “Visionary Leadership: Educational Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization; Digital Age Learning Culture: Educational Administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students; Excellence in Professional Practice: Educational Administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources; Systemic Improvement: Educational Administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources; Digital Citizenship: Educational Administrators model and facilitate understanding of

social, ethical, and legal issues and responsibilities related to an evolving digital culture” (p. 1-2).

As Mirara (2004), Valdez (2004), Benedetto (2006), Yu & Durrington (2006) and Schrum et al. (2011) found, by using the ISTE Standards for Administrators, or NETS-A, school leaders can move schools further in the right direction toward restructuring schools to keep up with an ever-changing society (Sincar, 2012). Another purpose of the ISTE Standards for Administrators, as found by Anderson and Dexter (2005), McLeod and Richardson (2011), Richardson and McLeod (2011), and Sincar and Aslan (2011) is for school principals to understand their roles as technology leaders, provide for the technological needs of all stakeholders, and fully accomplish technology integration in the educational process (Sincar, 2012). Lastly, the ISTE Standards for Administrators can be viewed as a reflection of change in educational policy. Stuart, Mills, and Remus (2009) and Wang (2010) found that new tasks are imposed on school principals, with principals now being seen as technology leaders who are to maintain and sustain effectiveness of technology integration, instruction, and overall management (Sincar, 2012).

The ISTE Standards are a significant set of standards in which the progress of technology integration can be measured. Most of the studies conducted in the context of technology leadership, both within and outside of the United States, use the ISTE Standards, previously known as the NETS, as a common point of reference (McLeod & Richardson, 2011; Sincar, 2012). Having a universal, worldwide set of standards is a step in the right direction toward more global learning. However, achieving all of the requirements of the ISTE Standards for Administrators does not guarantee that the school

administrator can effectively lead the school toward digital culture with high levels of learning and technology integration. Technology leadership is complex (Dexter, 2011) and does not solely depend on knowledge and implementation of the ISTE Standards for Administrators, but requires leaders to have strong knowledge and implementation of effective leadership practices and principles.

A leadership style that has been found effective and successful in the school improvement and change process is that of transformational leadership (Allen, Grigsby & Peters, 2015). As defined by Burns (1978), transformational leadership is a leader's ability to engage others for the purpose of building motivation toward a shared goal or vision (Allen et al., 2015). Transformational leadership closely aligns with the topics of digital leadership and digital culture, due to the fact that transformational leaders influence followers by creating a vision that goes beyond existing practices, taking risks, and encouraging change and innovation (Eliophotou-Menon, 2016). Along with the themes of the ISTE Standards for Administrators, the concept of transformational leadership will be addressed in the review of literature.

Visionary Leadership

Effective digital leaders are able to imagine a future beyond their current reality; they also create a shared vision and plan to get there. In particular, leaders develop a vision for technology integration with stakeholders, support the use of technology, and obtain necessary resources (Ünal, Uzun, & Karatas, 2015). Researchers have identified effective visionary leadership as a key ingredient of, and vitally important to, the success of any innovation in education. One of the most renowned and trusted researchers regarding learning organizations and developing a shared vision is Peter Senge. In 1990,

Senge suggested that leadership for creating a shared vision, or a vision that captures the collective mind and will, begins with creative tension. Senge (1990) describes creative tension as that which emerges from seeing clearly where we want to be, which is the vision, and describing truthfully where we are now, or the current reality. The gap between the two is what Senge (1990) defines as creative tension (Costa & Kallick, 1995). The principle of creative tension has long such been realized—Steve Jobs even observed that if you work on something you really care about and it excites you, you do not have to be pushed because the vision itself will pull you (Costa & Kallick, 1995). According to Senge (1990), creative tension can be resolved in two ways—by raising the current reality toward the vision or by lowing the vision toward current reality. Costa and Kallick (1995) built upon the work of Senge (1990) by finding that effective leaders know how to cause creative organizational tension and how to harness the energy and intellectual stimulation it produces to facilitate the process of developing a shared vision. While Senge’s work dates back to the 1990s, the core of his research on visionary leadership is still applicable today and is critical for successful visionary leadership, especially regarding the shared vision for digital leadership.

Visionary leadership is needed to enhance the transformation of our educational system by leveraging the potential that technology brings to teaching and learning. Some researchers, such as Salzano (1992), go so far as to say that the success or failure of integration efforts rests on the shoulders of school leaders (Ng, 2008). Visionary leadership in technology, as defined by the International Society for Technology in Education, requires leaders to “inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes the use of digital-age resources to meet and

exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders” (ISTE, 2014, p. 1). In the work of Dexter (2011), it was found that technology leadership can have a greater impact when a group of people work together, as this allows each member’s expertise to contribute to the work toward achieving the shared vision and goals (Dexter, 2011). Dexter went on to find that there are key artifacts that can be identified with effective technology leadership; these include technology vision, instructional support, alignment between resources and curriculum, and the ability for teachers to learn and provide input to the technology leadership team (Dexter, 2011). These key artifacts closely align with the ISTE Standards for Administrators, most notably with the foundational technology vision.

Law, Pelgrum, and Plomp (2008) brought to light the necessity of a vision for technology integration, along with the importance of access to technology that is supported and well managed, as key starting points for the success of technology integration in schools (Dexter, 2011). The visioning process requires leaders to “engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision” (ISTE, 2014, p. 1). Principals should not only serve as visionary leaders regarding technology, but also should “advocate on local, state, and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan” (ISTE, 2014, p. 1). Van Niekerk (2014) cites the work of West-Burnham (1992) that no school improves without being led. She goes on to emphasize the vital role that school leadership plays in leading school reform, specifically through implementing innovations and making improvement (Van Niekerk, 2014).

It takes a leader with the right approach to create a shared vision for the digital culture in a school. The works of Foskett and Lumby (2003) as well as Steyn and Van Niekerk (2005) found that principals who exhibited negative attitudes toward technology integration did not provide motivation for teachers, and actually discouraged the use of information and communication technologies. While it seems quite evident, it is important to note that negativity from the school leader inhibits the change needed to fulfill a vision for the future. On the other hand, it is not considered enough for school leaders to maintain a positive attitude toward innovation and technology; rather, they must also encourage teachers and students to incorporate innovation into the teaching and learning process (Cakir, 2012). In fact, research shows there is a link between principals' technology integration knowledge and their ability to motivate those to carry out the school's vision (Van Niekerk, 2014).

If principals are not knowledgeable regarding technology integration, that should not stop them. There are a variety of strategies they can use, such as learning from neighboring schools and districts to determining successful and effective practices for technology integration visioning (Sheninger, 2014). Principals who lack technology knowledge often think that bringing a consultant or sending staff to a conference will fill the void of digital leadership. However, Van Niekerk (2014) states that the principal is the "kingpin" to initiate and maintain technology integration opportunities. Digital leadership in a school must begin with and be maintained by the principal.

In fact, principals should find ways to model and incorporate technology into everyday practice. By doing so, school leaders can create and foster a digital-age learning culture in the school. Schrum et al. (2011) found that tech-savvy principals felt that an

increase in technology would bring new challenges for administrators in understanding technology, becoming role models, and developing a vision. One principal stated that leaders could not inspire teachers if they themselves are not technology savvy.

Administrators must have a vision for their technology use; they then must model this vision in professional practice and develop teacher leaders who share in the technology vision for creating a strong digital culture in the school (Schrump et al., 2011).

Digital Age Learning Culture

Educators today are charged with the task of preparing our children for the global and digital economy in a very pivotal time in education. We are in the midst of a revolution that is changing our society by placing an increased emphasis on the application of knowledge. Twenty-first-century educators must seek to find answers to what schools should teach in order for students to be prepared (Zhao, 2009). The culture in classrooms is changing, and many schools are finding that teachers are not equipped to facilitate twenty-first century, student-centered learning that focuses on collaboration, creativity, and innovation (Rotherdam & Willingham, 2009). While teachers have a great responsibility for altering the learning environment and creating a digital-age culture within the classroom, school administrators are responsible for effectively using technology and transferring this knowledge to teachers. School administrators are expected to take on the leadership role in creating a school with a digital-age learning culture (Ünal et al., 2015).

The restructuring of learning environments requires schools to develop shared beliefs and norms in determining what programs foster students' acquisition of twenty-first century skills (McLachlan, 2012). Research shows that the following factors play

key roles in determining effective preparation of twenty-first century skills in schools: curriculum, assessment, professional development, leadership, and culture. The Partnership for 21st Century Skills Framework (P21) identified key skills and student outcomes, which included learning and innovation skills, information, media and technology skills, and life and career skills (McLachlan, 2012). Some educators believe that children are not developmentally ready to gain complex thinking skills at a young age due to their concrete and simplistic thinking; however, emerging trends show that there is no set age when children are ready to acquire complex thinking skills (Silva, 2009). While it is widely accepted that students need twenty-first century skills in order to succeed in the workplace, these necessary skills are often missing from content standards. As schools seek to connect the gap between core curriculum standards and their school's culture, the development of twenty-first century skills certainly comes into play in establishing a strong connection (Chandrasekhar, 2009).

One of the ubiquitous terms in education today is 21st century skills, which are the labeled set of skills that the workforce demands of the next generation of workers. Within the classroom, students must be provided a digital culture in which they can become independent thinkers, problem solvers, and decision makers in order to compete in a global economy (Silva, 2009). The needs of the world are changing, and consumers must be prepared entrepreneurs and innovators with strong communication abilities. Society has evolved into a world of real-time communication and learning through the use of technology (McLachlan, 2012), and it is critical for today's schools to hold similar values in regard to technology and innovation.

Preparing students for an unknown future can be a daunting task and an enormous undertaking for educators. While specific jobs are unknown, the needs for adaptability in thinking, decision-making, and problem-solving have been identified as essential (Fox, 2011). “It is the responsibility of educational leaders to prepare students not just for today, but to become positive contributors to society, which now includes a large digital component” (Ribble & Miller, 2013, p. 142). Wagner (2008) warned that those who do not provide a learning environment in which to prepare students for the twenty-first century would be held responsible for placing the nation at risk. In order to serve society, Niekerk (2014) writes that schools should value innovation and keep up with the developments and digital demands of the twenty-first century. The role of the principal is essential in helping teachers establish a culture that values risk taking, promotes exploration, and celebrates innovation (Schrum et al., 2011). The International Society for Technology in Education calls for school leaders to “model and promote the frequent and effective use of technology for learning” (ISTE, 2014, p. 1). Creighton (2003) found that principals who are comfortable with technology become models of technology use in schools. After all, if the goal is to encourage teachers and staff members to believe in and use technology, then the principal is the key figure in its adoption, promotion, and integration (Cooley & Reitz, 1997; Creighton, 2003; Brockmeier, Sermon & Hope, 2005). Principals can use technology to accomplish the management tasks of the school, and should look for ways to integrate technology into the daily culture of the academic, behavioral, administrative, and supervisory aspects of the position (Creighton, 2003). Digital leaders model the use of technology with the motto that if I use it, they will use it. The effective 21st century administrator is a hands-on user of technology (TSSA

Collaborative, 2001), who realizes that all eyes are on him or her. Additionally, the 21st century administrator understands that teachers hear and see everything he or she does, so establishing a culture of experimentation and risk taking is critical (Creighton, 2003).

Brown (2014) cites the work of Picciano (2011), who unveiled that successful leadership in technology requires planning at all levels in order to foster the kind of commitment, collaboration, and continuity that are necessary for long-term successful implementation and growth of technology. The ISTE Standards for Administrators call for principals to “ensure instructional innovation focused on continuous improvement of digital-age learning” (ISTE, 2014, p. 1). While a belief in and value of technology is an important component of education today, the pedagogy must not be lost. Ribble and Miller (2013) cite the work of Fullan (2013), who identified that technology can make education more efficient, but it cannot be a replacement for good teaching. In fact, technology can support a number of research-based strategies (Wahl & Duffield, 2005). The work of Marzano, Pickering, and Pollock (2001) identified the nine most effective instructional strategies, most of which can be facilitated or even improved using technology (Brabec, 2004; Wahl & Duffield, 2005). As schools transform into digital age learning environments and educators continue to learn more about technology, there is a need for viewing technology as a tool to help, support, and extend learning (Ribble & Miller, 2013). The ISTE Standards for Administrators call for leaders to “provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners” (ISTE, 2014, p. 1). By taking a differentiated approach to instruction, teachers accommodate differences in learning styles and tailor the teaching to each student’s individual needs. Creating a culture of learner-centered,

differentiated instruction is not an easy task and the use of technology is pivotal. While many of the technology resources that schools already have can be used to facilitate differentiated instruction to meet the needs of all learners, the power of this readily accessible technology may not be obvious to all teachers. Therefore, it is critical for the principal to foster a shared commitment to technology in his or her staff. The principal does this by modeling instructional technology tools in a way that promotes a digital culture and the use of these resources to support differentiated teaching and learning (Wahl & Duffield, 2005).

Excellence in Professional Practice

Living in a time where technology is ever changing, Unal et al. (2015) found that the need for school administrators to adapt to technological developments has become indispensable. It is of the utmost importance for school administrators to develop themselves as technology leaders by creating and supporting an environment of professional learning. Included as a part of this standard, ISTE suggests that leaders “allocate time, resources and access to ensure ongoing professional growth in technology fluency and integration” (ISTE, 2014, p. 1). There is currently a gap between the necessary professional development to make technology integration successful and current technology professional development practices.

The Standards for Professional Learning, developed by Learning Forward, are a set of highly recognized standards for effective professional learning and are indicators that guide the facilitation, implementation, and evaluation of professional learning (Learning Forward, 2001). The Learning Forward (2001) Standards for Professional Learning include: Learning Communities, Leadership, Resources, Data, Learning

Designs, Implementation, and Outcomes. These standards encourage dialogue, discussion, and analysis that lead to increased effectiveness in professional learning, regardless of the current state of educational practices (Learning Forward, 2001). Learning Forward (2001) provides strategies for school leaders to implement the standards, which include: sharing the standards with external professional development providers who facilitate professional learning with staff, sharing the standards with stakeholders to foster their support for professional learning as a means to increase student learning, and bringing the standards into all program implementation or improvement discussions. When thinking about the Standards for Professional Learning and technology integration, the two go hand in hand. Principals should use the standards as a framework for providing professional learning opportunities for staff in areas that increase student engagement and academic achievement, specifically including professional development centered on effective technology integration.

Research from Atkins and Vasu (2000); Casey and Rakes (2002); Wang, Ertmer, and Newby (2004); and Ertmer (2005) found that technology training for teachers does have an impact (Schrum et al., 2011). While it is known that quality technology support for teachers is directly linked to increased frequency and a variety of technology uses to support instruction, about half of American public school educators receive only 1 to 8 hours of professional development a year (Dexter, Anderson, & Ronnkvist, 2002; Dexter, Seashore, & Anderson, 2002; Gray, Thomas, & Lewis, 2010). Gray, Thomas, and Lewis (2010) found that nearly two-thirds of teachers report that they are sufficiently trained to integrate technology in their classrooms (Dexter, 2011). With a lack of high-quality professional development in the area of technology integration to support teaching and

learning, teachers are often left on their own to find ways to grow as twenty-first century educators. The study from Gray et al. (2010) revealed that teachers are most often being prepared to use technology effectively on their own (Dexter, 2011).

In a study done by Schrum et al. (2011), technology savvy administrators, identified through the International Society for Technology in Education, were asked how they learned what they know and how they lead their schools in the twenty-first century. The school-based administrators in this study reported that they learned about technology on their own during their teacher preparation programs, by using technology as a classroom teacher, and through the managerial tasks in the principalship (Schrum et al., 2011). One principal in the study reported that he learned about technology in his teaching through professional development opportunities and exploring on his own, an answer that parallels the work of Dexter (2011). Another elementary principal in the study done by Schrum et al. (2011) stated that his experience with technology professional development occurred through reading literature, attending conferences, as well as using the equipment housed in the school. In essence, Schrum et al. (2011) found that effective tech-savvy administrators learn about technology on their own, have a dedication to these changes, promote their staff members' implementation through professional development, model its use, and purposefully set goals for their school.

In addition to the lack of adequate teacher professional development, the National Center for Education Statistics (2000) found it problematic that regardless of the amount of training that teachers receive, unless teachers have the leadership of their administrator, they may not be able to successfully implement the technology (Schrum et al., 2011). While many studies focus on the professional development for teachers, or

lack thereof, teachers are not alone. Twenty-first century administrators are called to be technology leaders, with much of the same lack of professional development, guidance, or training. The work of Holland and More-Steward (2000) found that it does not appear that the same level of effort has been given to prepare administrators in understanding the challenges they will face to support the effective integration of technology and provide them with the knowledge they need to be effective change agents in their schools (Schrum et al., 2011).

Dexter (2011) found that school leaders need clearer direction on how leadership and resources can be optimally combined to utilize technology to support teaching and learning goals. Most roles of the principalship are clearly acknowledged and defined; yet, the role of the principal as a digital leader still remains unclear. As written by Eren (2011), there is no clear definition of school principals' duties regarding their technology leadership in schools, yet there is apparent responsibility for school principals regarding technology integration in schools. Leaders are trying to figure out the extent principals should influence teachers' effective and sustainable integration of instructional technology through teacher professional development (Niekerk, 2014). The International Society for Technology in Education, or ISTE, recommends that leaders "facilitate and participate in learning communities that stimulate, nurture and support administrators, faculty, and staff in the study and use of technology" (ISTE, 2014, p.1).

Brown (2014) found professional learning networks and communities to be essential tools for educational leaders. Professional networks and communities provide digital leaders with resources from which to grow professionally through maintaining access to colleagues, materials, and web-based tools (Brown, 2014). The work of Bauer

(2010) found that the core of professional learning networks is an assortment of resources that principals, teachers, and technology personnel can access when there is a need for new ideas or techniques for improving oneself professionally (Brown, 2014). The Regional Educational Media Center Association of Michigan developed a project known as “21 things for teachers,” which aligns with the International Technology for Education Standards and is intended to help educators make connections between technology tools and practice strategies. It provides opportunities for technology leaders to collaborate in order to professionally grow in relation to 21st century skills. This group found that when educational technology leaders construct their own professional learning networks and communities, they are able to access lesson plans from expert teachers, brainstorm solutions to technology problems, learn about new resources such as software and websites, and stay up to date with educational technology news and professional development opportunities from technology integration specialists (Regional Educational Media Center Association of Michigan, 2017).

As information and communication technologies become more sophisticated, teachers need the support of school leaders in adopting up-to-date skills and gaining relevant competencies that are critical to successful technology integration in education (Francis & Ezeife, 2007; Demiraslan & Usleul, 2008; and Neikerk, 2014). Supportive and ongoing professional development for technology integration is a critical element for teachers’ successful integration of information and communication technologies into the curriculum (Zhao & Bryant, 2006; Demiraslan & Usluel, 2008; and Neikerk, 2014). School leaders can support teachers in technology integration, as outlined by the ISTE Standards for Administrators, as they work to “promote and model effective

communication and collaboration among stakeholders using digital age tools” (ISTE, 2014, p. 1).

Even with the most knowledgeable and supportive digital leader, there may still be resistance from teachers and staff to grow professionally in the area of technology integration. Despite the research and efforts to reform outdated teaching practices, there still are educators who are apprehensive about the integration of technology into their teaching and learning practices and may avoid such integration (Jamieson-Proctor, Brunett, Finger & Watson, 2006; Jimoyiannis & Komis, 2007; Nichols, 2007; and Neierk, 2014). Many veteran teachers are hesitant or indifferent to using technology because they have not experienced the same success with technology integration as their colleagues (Bingimlas, 2009; Clarke & Zagarell, 2012; and Puckett, 2014). “Those who strive to be instructional technology leaders must attempt to motivate those who struggle with its implementation so that all students receive the advantages offered by technology” (Puckett, 2014, p. 4). Educators have come to a time in education where the spotlight has shifted to the principal as the key change agent for sustained technology integration in schools (Di Benedetto, 2006; Pelgrum, 2007; Vallance, 2008; and Neierk, 2014). As twenty-first century digital leaders, principals should “stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning” (ISTE, 2014, p. 1).

Systemic Improvement

Many learning organizations in the United States focus on student achievement through high-stakes assessments, with an emphasis placed on data and levels of

proficiency. However, over time this has proven to be an ineffective way to increase learning for all students. More recently, there has been a realization in education that the focus must shift to improvement strategies that will have a positive effect on all students and teachers in the educational system (Bernhardt, 2015). Bernhardt (2015) found that schools leaders must gather and analyze data that will help them understand where they are now as a system, why they are getting the results they are getting, and if they are not happy with the current results, how to achieve better results in the future. Furthermore, Bernhardt (2015) suggests that schools need a framework to guide the improvement of teaching and learning for each teacher and student. This analysis is especially critical as school leaders implement innovative systemic improvement strategies that involve technology. Schools today are learning that if they do not analyze and change inefficient processes or outdated practices, they will keep getting the same results (Bernhardt, 2015).

An essential component of effective systemic improvement is technology leadership, or the management of technology usage in schools. Anderson and Dexter (2000) found that the school leaders with strong technology leadership skills are those most likely to facilitate all stages of instruction and school management by effectively integrating educational technologies into all aspects of the school. In fact, “the level of technology leadership highly reflects the quality of leadership in school, as being good at technology leadership is associated with high quality school leadership” (Sincar, 2012, p. 1273). In addition, the research cited in Sincar’s (2012) work has shown that technology leadership positively influences leadership skills of school administrators. Administrators with strong leadership and management skills can lead purposeful change to maximize

the achievement of learning goals through the appropriate use of technology and media-rich resources (ISTE, 2014).

Another important component of systemic improvement, as outlined in the ISTE Standards for Administrators, is that school leaders “recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals” (ISTE, 2014, p. 2). Douglas Reeves (2009) found that the two variables that have the most profound influence on student achievement are teacher quality and leadership quality. Reeves (2009) cites the work of Haycock (1998), Darling-Hammond and Sykes (1999), and Yun and Moreno (2006) in supporting the effect of teacher quality on student achievement. Reeves (2009) sheds light on the fact that educational research has equipped us with ample evidence on instructional and leadership strategies that will lead to probable improvement of student achievement (Marzano, Waters & McNulty, 2005; Waters, 2005). Yet there is a gap between the research and current practices in our schools, especially as related to technology integration. Some of the specific strategies that Reeves (2009) outlines for school leaders to overcome this implementation gap include creating short-term wins, recognizing effective practices simply and clearly throughout the year, emphasizing effectiveness and not popularity, and making the case for change, associating it with moral imperatives rather than compliance with external authority. One specific strategy for creating these short-term wins, emphasizing effectiveness, and creating a compelling case for change is to have key innovative teacher leaders in the building that can teach others by example. Many teachers will not adopt a new way of teaching until they see the benefit. Yet once teachers learn more innovative practices, they will build their innovation toolbox—one

that allows them to choose exactly what is needed at a moment's notice (Campbell, 2012).

Schrump et al. (2011) found it important to note that the culture of most schools, in which teachers are free to choose from a range of teaching practices, must address a systemic effort to infuse technology into the school environment. It is the responsibility of the school leader to “establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching and learning” (ISTE, 2014, p. 2). The principal's role is to secure resources to support the use and integration of technology in the school (Creighton, 2003). Examples of resources include hardware, software, and other equipment to support technology integration. Brockmeier, Sermon, and Hope (2005) found that principals need general knowledge about hardware capabilities and software applications in order to support and enhance instruction (Gosmier & Grady, 2007).

When principals forgo their individual desires and pursue the goals of the educational organization, they can earn the respect of others and discourage members from putting their personal interests above those of the educational system. Effective educational leaders consider the educational system as one with common goals, which demands that their behavior be consistent with the educational system (Mehdinezhad, 2016). The International Society for Technology in Education calls for principals to “establish and leverage strategic partnership to support systemic improvement” (ISTE, 2014, p. 2). In order for systemic improvement to occur, the ISTE Standards for Administrators (2014) calls for leaders to “collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and

students learning” (p. 2), which also supports the work of Reeves (2009), Marzano, Waters, & McNulty (2005), and Bernhardt (2015).

Research has clearly shown that quality teaching matters to student learning (Hattie, 2008; Hightower, Delgado, Lloyd, Wittenstein, Sellers, & Swanson, 2011; Marzano, Pickering, & Pollock, 2011). The most important system-based factor in student achievement is teacher quality (Wright, Horn, & Sanders, 1997; Rivkin, Hanushek, & Kain, 2000; Rowan, Correnti, & Miller, 2002; McCaffrey, Lockwood, Koretz, & Hamilton, 2003; Hightower et al., 2011). In addition, the effects that teachers have on student learning have been found to be enduring and profound (Kain et al., 1998). Principals know that achievement data provides invaluable support for making good decisions regarding staff performance and student learning (NAESP, 2011). The National Association of Elementary School Principals (2011) recommends that principals put data to the best use by making data part of the ongoing cycle of instructional improvement, teaching students to examine their own data and set learning goals, establishing a clear vision for school-wide data use, providing support that fosters a data-driven culture within the school, and developing and maintaining a district-wide data system. How well principals use data to support instructional decision-making is a strong factor that determines the level of systemic improvement in a school (Reeves, 2009; Marzano, Pickering, & Pollock, 2011; NAESP, 2011; Bernhardt, 2015).

Digital Citizenship

Educational leaders are increasingly expected to become digital leaders for their school communities (Sheninger, 2011). There is a gap in technology knowledge and a lack of leadership preparation related to digital citizenship and digital literacy in schools,

which can cause serious problems. Many school leaders, parents, and communities are facing these problems at increasingly frequent rates (Ribble & Miller, 2013). Today's learners have a plethora of digital devices available to them, which has expanded the opportunity for learning beyond the constraints of the traditional classroom (Campbell, 2012). Ribble & Miller (2013) cite the work of Lenhart et al. (2011), which found that 95% of all teenagers, ages 12 through 17, are now online. 80% of those online teens are users of social media. The reality of increased access to technology has created a new set of citizenship skills that students must be aware of and acquire in the twenty-first century. Many parents are unaware of how to teach digital citizenship concepts to their children, yet they give them ever-increasing access to digital devices. Therefore, teaching the foundational concepts of digital citizenship has fallen on the school. Former president of the American Counselor Association Sabella (2010) stated that parents "are not taking the time and effort to educate themselves, and as a result they have made it the responsibility of the schools. But the schools didn't give the kids the cell phones" (Ribble & Miller, 2013, p. 136). If students are not learning to be good digital citizens at school, then they are not learning this responsibility at all.

According to ISTE, school leaders should "promote, model and establish policies for safe, legal, and ethical use of digital information and technology" (ISTE, 2014, p. 2). Changes in technology are causing school leaders to add new policies and guidelines for safe and appropriate use, while at the same time working to improve their own digital skills. The United States Department of Education has stated that educational environments need to be a safe place for students, which now includes digital safety (Cator, 2011). "Technology users of all ages are now reaping the benefits, as well as the

problems, that go along with more than a decade of rapidly increasing technology advances, without direction about appropriate use” (Ribble & Miller, 2013, p. 136). Educational leaders possess an increasing focus on addressing specific technology and digital citizenship issues, such as cyberbullying and other technology misuse. It is the responsibility of educational leaders to protect students, which can be problematic if leaders do not take proactive steps in finding solutions to cyberbullying and other technological issues (Ribble & Miller, 2013). Today’s school leaders are facing issues each day involving technology abuse in school. As leaders face increasing legal responsibility, schools and districts must work together to determine how to best address these issues as they occur (Ribble & Miller, 2013). Increasing access to technology is not the issue, but rather when technology is provided without direction. In an effort to address potential technology issues and cyberbullying, school leaders must guide students and staff in recognizing personal responsibility and in developing empathy for others, both in the real and virtual worlds (Ribble & Miller, 2013).

In 2011 ISTE released the second edition of *Digital Citizenship in Schools*, which focused on nine elements and attributes of digital citizens (Ribble & Miller, 2013). These overarching categories included: Respect—Educate—Protect, or REP. “Respecting Yourself and Respecting Others” included digital etiquette, or electronic standards of conduct or procedure; digital access, or full electronic participation in society; and digital law, or electronic responsibility for actions and deeds. Elements included in “Educating Yourself and Educating Others” were digital communication, or the electronic exchange of information; digital literacy, or the process of teaching and learning about technology and the use of technology; and Digital Commerce, or electronic buying and selling of

goods. In “Protect Yourself and Protect Others,” the elements of digital rights and responsibility, or the freedoms extended to everyone in a digital world; digital security, or electronic precautions to guarantee safety; and digital health and welfare, or physical and psychological wellbeing in a digital technology world were included (Ribble & Miller, 2013, p.45). These nine areas require technology users to think about how they are currently using online technology with others. As shown through the three overarching categories, technology users must be aware of not only their own digital actions, but also the digital actions of those in which they interact (Ribble & Miller, 2013).

Learners are able to access information quickly and effectively through an increasing number of online technologies, known as “Web 2.0” tools (Campbell, 2012). It is important for principals to “ensure equitable access to appropriate digital tools and resources to meet the needs of all learners,” according to the ISTE Standards for Administrators (ISTE, 2014, p. 2). Sheninger (2011) shares that students are connecting, creating, discussing, and collaborating. Furthermore, the Internet as we know it in the 21st century is what today’s students have known their whole lives (Sheninger, 2011). Because technology is such a fluid part of students’ daily lives, it is essential that digital citizenship and technological literacy are taught starting at a very young age (Ribble & Miller, 2013). The Online Safety and Technology Working Group, or OSTWG, recommended in 2010 that digital citizenship elements should be a national priority in pre-kindergarten through twelfth grade education. The report from this group also recommended that educators teach the constructive, mindful use of social media, enabled by digital citizenship and new-media literacy training, as an integrated approach into regular subjects rather than in isolation (Ribble & Miller, 2013).

When considering the need for teaching digital citizenship, social media may be the area with most pertinent implications for students. As technology and social media use by students becomes more prevalent, teachers, principals, and districts are looking for ways to engage with students and the community in a relevant, engaging, and appropriate way (Odom, Jarvis, Sandlin, & Peek, 2013). The ISTE Standards for Administrators outline digital citizenship by stating that school leaders should “promote and model responsible social interactions related to the use of technology and information” (ISTE, 2014, p. 2). Researchers found that a carefully planned application of social media can have a great influence on student learning and engagement with the content (Gifford, 2010; Laru & Jarvela, 2012; Novak, Razzouk & Johnson, 2012; Odom et al., 2013). Platz (1994) found that when educators provide their students with a sense of ownership, they are more motivated to learn—and opportunities to engage with social media do just that (Odom, 2013). By allowing students to post information, they are able to cognitively apply content and process the information in a deeper, more meaningful way. As a result, students can share their responses to learning through discussion threads online so they can interact and learn from others. Students can share articles, videos, websites, and even create their own content that can be shared via social media. All of these examples provide students a way to remain actively engaged in the learning process (Odom, 2013). Social media is changing the way that students learn, the way that teachers teach, and the way that administrators lead.

Dyer, Gregersen, and Christensen (2009) found that innovative leaders go out of their way to meet people with different kinds of ideas and perspectives to extend their own knowledge (Campbell, 2012). As previously reviewed, professional learning

networks provide a digital community in which leaders can grow and learn. Having access to a wealth of “just in time” information on a global level about best practices and current global topics in education provides leaders with distinct advantages over those who are not part of a professional network or community (Brown, 2014). ISTE calls for leaders to “model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools” (ISTE, 2014, p. 2). Educational leaders must make sure that they are modeling digital citizenship, that students within their schools are safe, and that students learn the skills to live and thrive in the digital world. It is vital that school leaders act responsibly to provide digital-age leadership and embed digital citizenship elements into all aspects of teaching and learning (Ribble & Miller, 2013).

While the International Society for Technology in Education Standards for Administrators are widely accepted as the pillars by which to measure principals’ digital leadership, these standards alone are not the only factor influencing the successful implementation of a digital culture by school leaders. Principals must frame their decisions through an appropriate lens of leadership and utilize the most applicable style of leadership. Through a review of literature, it was found that a transformational leadership style is most effective, as transformational leaders support and inspire innovation and a strong digital culture (Bass & Riggio, 2006; Moolenaar et al., 2010; Allen et al., 2015; Sagnak et al., 2015). In the next section, more detailed information will be provided regarding transformational leadership.

Transformational Leadership

According to Moolenaar, Daly, and Slegers (2010), transformational leadership is one of the most prominent modern leadership theories in which there is an emphasis placed on the leader's ability to recognize the potential skills of a teacher and engage the whole person, not just his or her particular traits (Allen et al., 2015). Transformational leaders inspire their staff by creating a safe environment, so that they themselves feel empowered to think and act in an innovative way. Transformational leaders influence the beliefs, values, and goals of the followers because the followers look up to them. Transformational leaders confirm the ideas and values of the followers to inspire them to use new methods, which is itself a motivating practice (Mehdinezhad, 2016). The research on transformational leadership assumes that transformational behaviors and practices will result in educational effectiveness and satisfaction on the part of the followers—in this case, the teachers (Eliophotou-Menon, 2016). Principals who exhibit transformational leadership qualities play a major role in the fostering of conditions for school improvement by inspiring and motivating teachers' engagement in professional learning activities, which can impact student achievement (Allen et al., 2015).

Bass and Avolio (1994) proposed five factors as the main dimensions of transformational leadership. First, attributed idealized influence is the degree to which followers consider leaders to be trustworthy and possess charisma, a clear and attainable mission, and a vision for the organization. The second factor is idealized influence as behavior, which is defined as the actual leader's behavior characterized by values and a sense of purpose. Third, inspirational motivation is the behavior of the leader, which serves as a source of inspiration for followers by providing them with meaning and

challenge. Next, the intellectual stimulation factor is the degree to which leaders encourage followers to be creative and innovative so that they adopt a critical stance in relation to prevalent assumptions and traditions. The last factor is individualized consideration, demonstrated when leaders focus on individual needs and deal with followers on a one-to-one basis (Eliophotou-Menon, 2016). Eliophotou-Mennon (2016) found the research for transformational leadership still to be in the early stages. However, it has been found that when teachers believe that their principal exhibits a high level of these idealized attributes, they identify better with their leader; therefore, leading them to feel more positive about the overall school climate (Allen et al., 2015).

Principals who have a transformational leadership style empower their teachers and generate a school climate that supports innovation (Sagnak, Kuruoz, Polat & Soylu, 2015). The relationship between transformational leadership qualities and the influence on follower outcomes and the development of a positive climate is important to note. Moolenaar et al. (2010) found that transformational leadership was positively related to teachers' perceptions of their school's climate of innovation (Allen et al., 2015). According to Bass and Riggio (2006), transformational leaders inspire their staff to be creative and innovative, while avoiding criticism and embracing mistakes. When teachers believe that the principal will support new initiatives and will help them work through problems, they are more willing to try something new. In addition, when a transformational leader is excited about a particular initiative and displays optimism that a school-wide goal can be accomplished, the followers will share in that enthusiasm and be more dedicated to the process. Principals who exhibit high levels of inspirational

motivation also excite staff and encourage support for future plans, which has a positive impact on teachers' perceptions (Allen et al., 2015).

Studies of transformational leadership at the school level (Bogler, 2001; Griffith, 2004; Leithwood & Jantzi, 2006) found an impact on teachers' perceptions and behavior (Eliophotou-Menon, 2016). Bass (1999) and Hallinger (2003) discovered that transformational leadership was linked to the commitment of staff to the organization, and positively affected teachers' attitudes toward their school, as well as their commitment to change and learning (Eliophotou-Menon, 2016). Another influencing factor of school climate is teacher perceptions of a principal's leadership style. In 2009, Rhodes, Camic, Milburn, and Lowe found that principals can improve teachers' perceptions of school climate by exhibiting transformational leadership qualities, such as collaborative decision making, and attempting to remove obstacles that prohibit teachers from focusing on instruction and innovation. It was discovered that as a teacher's perception of leadership improves, he or she becomes more effective in the classroom (Allen et al., 2015).

In 2014, Goff, Goldring, and Bickman conducted a study to research the extent to which a principal's self-assessment of leadership characteristics matched his or her teachers' perceptions of the same characteristics. The results revealed a large, measurable gap between the two sets of perceptions, which suggested that teachers see and interpret various leadership characteristics differently than their principal (Allen et al., 2015). While this study was enlightening, a review of the literature found a lack of additional research in which principals' perceptions and teachers' perceptions were analyzed regarding digital leadership and digital culture. Given the importance of transformational

leadership as a contributing factor to innovation, school climate, and academic success (Allen et al., 2015), it is evident that there is a need for further research to be conducted in which principals' perceptions of implementation of the ISTE Standards for Administrators and teachers' perceptions of the ISTE Standards for Teachers are studied.

Summary

In chapter two, a review of the literature revealed the importance of school administrators as the source of inspiration and leadership in the implementation of the organization's shared vision for effective integration of technology (Schrum et al., 2011; Cakir, 2012; ISTE, 2014; Sheninger, 2014). Principals are ultimately responsible for ensuring that the teaching and learning in the school meets the demands of 21st century standards; therefore, it is more important than ever for principals to be equipped as digital leaders (Testerman et al., 2002; Dexter, 2011). In order for principals to implement the International Society for Technology in Education Standards for Administrators and build a strong digital culture in the school, they must use the right style of leadership. It was found that utilizing a transformational leadership style supports and inspires innovation and a strong digital culture (Bass & Riggio, 2006; Moolenaar et al., 2010; Allen et al., 2015; Sagnak et al., 2015).

Chapter two provided a literature review with information about the themes related to this study including visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, digital citizenship and transformational leadership. In chapter three, details of the methodology will be provided, which include the participants, sampling procedure, research setting, and research design. Also addressed will be the details of the instrumentation, including the validity and

reliability of both the instrument and study. In addition, statistical treatment of the data and rationale for the treatment will be explained.

Chapter III

Methodology

Introduction

This quantitative descriptive study was designed to examine the nature of the relationship between a principal's digital leadership and the teachers' digital implementation in the school. The purpose of this study was to determine the level of significance between the principals' digital leadership and the teachers' level of self-efficacy for modeling twenty-first century skills. The ISTE Standards for Administrators and the ISTE Standards for Teachers were foundational elements in this study; therefore, the researcher selected survey tools with strong alignment to these standards. In this chapter, details of the participants, procedures, research setting, and design will be given.

Participants

The participants in this study included elementary principals and teachers in the state of Missouri. All elementary principals were invited to participate in the study; however, all principals did not respond. Of the 1,134 principals who were invited, 260 actually participated in the study, for a 23% return. For the purposes of this study, elementary principals were defined as lead building principals in buildings which included any make up of kindergarten through fifth grades, with no other excluding factors. The principals who participated were instructed to forward the teacher survey to five teachers in the building who would serve as a representative sample. In total, 260 principals participated in the study, which provided an opportunity for 1,300 teachers to participate. Of the 1,300 teachers invited, 358 actually participated, for a 28% return.

During this study, ethical considerations and precautions were made to ensure that there were no risks for participants from whom the data was collected. No compensation was given to participants, and participation in this study was voluntary. There was an optional incentive offered in the email sent to principals. Twenty, ten-dollar Amazon gift cards were randomly drawn and given to principals who participated in the study and chose to be included in the drawing. Email addresses were extracted from the data and used solely for the purpose of the incentive drawing. Emails were not associated with any data analysis to ensure confidentiality, but were only used to notify those selected for the gift cards.

A numerical coding method was not necessary in this study, as the principals who participated had their email addresses automatically collected through Question Pro when they agreed to participate in the study. Question Pro is a password protected and secured system, which kept the data from this study safe and confidential. In the initial email to principals, information was provided regarding the purpose of collecting their email address. Principals were instructed to select five teachers from their building at random to participate in the study. Principals who participated in the study were given information regarding the survey to disseminate to their selected teachers. When the survey was forwarded to teachers, the responses from the teachers were linked back to the building principal's email address. Collecting principals' email addresses allowed for an automatic method of matching each principal to his or her corresponding teachers participating in the survey. Therefore, the principals who participated in the study and wished to participate in the drawing had the opportunity to have up to six entries, based on the return from their building.

There was a confidentiality statement included in the survey, which detailed how responses from all participants would remain confidential. Due to the use of a drawing as an incentive for participation, anonymity could not be guaranteed for this study. Again, principals had the choice to participate in the drawing, which required them to enter their email address at the end of the survey. Principal participation in the drawing did not in any way impede the confidentiality of his or her responses in the survey. While anonymity could not be guaranteed, confidentiality was ensured for all participants.

Procedures

In accordance with the guidelines of Southwest Baptist University regarding the protection of human participants, a request for review was submitted to the Research Review Board for approval to survey Missouri elementary principal and teacher participants for this study. There were 1,134 principals invited to participate, of which 260 actually participated, for a 23% return. Participating principals were instructed to forward the teacher survey to five teachers in the building who would serve as a representative sample. With 260 principal participants, there was an opportunity for 1,300 teachers to participate. Of the 1,300 teachers invited, 358 actually participated, for a 28% return.

After receiving RRB approval, participant recruitment and data collection began. The informed-consent documents for teachers and principals to conduct research can be found in Appendices A and B. Before beginning the online survey, principals and teachers were provided with information about the purpose of the study, voluntary participation, and confidentiality of information gained through the survey. In order to

begin, teachers and principals completing the online survey had to click the “I Accept” button.

In a study that sought to determine the impact between two groups, it was necessary to have participation from principals and teachers within the same building. If a principal was unwilling to participate in the study, teacher survey data from that building could not be used in the analysis of the research questions. Therefore, it was necessary to first obtain consent to participate in the study from the building principal before disseminating the online survey to teachers. Principals who agreed to participate in the study were instructed to use a random selection method to distribute the survey to five teachers in their elementary school building. The directions for random selection instructed principals to select five teachers who would serve as a representative sample of the building. For example, a principal could choose a primary teacher, intermediate teacher, specials teacher, gifted education teacher, and special education teacher to participate.

By asking principals to randomly select five teachers who would serve as a representative sampling of the building, the researcher made the assumption that each principal would follow those directions in the distribution of the survey. Utilizing this method for disseminating the survey to teachers allowed for a principal to be biased in who was selected to participate. Principals were discouraged from giving the survey to a team of teachers. They were also discouraged from only giving the survey to teachers with a high level of technology integration. The possibility for bias in who was selected and the assumptions made regarding the dissemination of the survey to teachers were taken into consideration by the researcher when analyzing the findings in this study.

The online surveys were created through Question Pro. Principals received a unique URL, or specific online web address, to the online principal survey in the email that was generated and sent to them through Question Pro. When each principal completed the survey, Question Pro automatically sent an email to the principal with the URL for the online teacher survey, along with the directions for disseminating the teacher survey to five members of his or her staff. Consent to participate in the study was received by participants reviewing the consent document and clicking “I Agree” before beginning the survey. Initial email invitations for elementary principals to participate in the study were sent in February 2017. Participants had a two-week window in order to complete the online survey. With one week remaining to complete the survey, there was an automatically generated email from Question Pro sent to remind and follow up with those principals who had yet to take the survey. Due to low participation in the study, the researcher extended the survey window to allow two additional weeks for participation. During this extended window, the researcher did additional face-to-face follow up with Missouri elementary principals to encourage participation in the study. Each week the researcher sent a follow-up email through Question Pro to principals who had not yet participated in the study. In addition, the researcher sent follow-up emails specific to each participating principal to notify him or her of the number of teachers who had taken the survey from his or her school. The researcher provided the principal participants with an email to forward to the five-teacher sample as a reminder to complete the teacher survey. After the March 2017 closing date, the survey was locked and unable to accept any additional participant responses. After the study was finished, data from the study was

archived in Question Pro. The raw data from this study will be kept for five years and will be available to other researchers for reanalysis.

Selection/Sampling

A numerical coding method was not necessary in this study, as each principal's email address served as the coding method for the survey. When a principal took the survey, his or her email address was automatically tracked through Question Pro. The principal's email address served as the code for his or her school; therefore, when the teachers took the survey they entered their principal's email address to link the principal and teacher surveys together. There was a confidentiality statement included at the beginning of both the principal survey and the teacher survey, which stated that the responses provided would be used for the purpose of the overall study and the researcher would keep all responses confidential. Due to automatically collecting the principals' email addresses, anonymity could not be guaranteed for the principals who participated. However, the teacher survey did not automatically track the teacher's email address, so the teachers were guaranteed anonymity. Again, if principals chose to participate in the drawing, the email that they entered was only used for the drawing purposes and was not used to identify them in the study.

There was not a specific sampling method used to select participants for this study, as all elementary principals in the state of Missouri were invited to participate. By using the whole state as the sample population, there was a random, well-balanced group with a wide range of perspectives related to the topic included in the collected responses. Another reason for inviting all elementary principals in the state of Missouri to participate was to gather a large enough sample to be able to make generalizable

conclusions from the study. Conclusions from the study would not only be generalizable for the state of Missouri, but also for other states. The surveys used for principals and teachers were aligned to international technology standards, therefore making the conclusions generalizable in other states. The survey was distributed to all elementary principals in the state of Missouri, which included approximately 1,100 principals, 260 of which actually participated in the study for a 23% return. Principals who participated were instructed to send the teacher survey to five teachers in the building who would serve as a representative sample. Of the 260 principals who participated, there was an opportunity for 1,300 teachers to participate, of which 358 actually participated for a 28% return. Having a larger sample population allowed the researcher to examine the results from a variety of angles to identify common themes.

Research Setting

All participants in this study were from the state of Missouri. Participants were asked several demographic questions at the end of the survey. Demographic questions for principals included age, as defined by ten-year age brackets, and years in administration. The demographic questions for teachers were similar and included age, as defined by ten-year age brackets, and years in education. Including the demographic information allowed the researcher to further analyze the data.

Research Design

The research design used for this study was a quantitative descriptive method. A quantitative descriptive study is a quantitative method of research in which associations between variables are established (Sharpe, 2008). In a quantitative descriptive study, participants are surveyed once with the intention of establishing associations between the

variables in the study. The study may include a very large sample population to ensure that a valid estimate of a generalized relationship between variables has been obtained (Gay & Airasain, 2003). The researcher examined the relationship between the responses from the principal survey data and the corresponding teacher survey data to determine if there was significance at the .05 level. The reasonable standard for rejecting the null hypothesis is known as the alpha level. The accepted probability value for the alpha level was set at .05. In essence, the researcher may reject the null hypothesis and conclude that his or her hypothesis is correct only when findings would have occurred by chance less than 5% of the time (Pelham, 2013).

Instrumentation

Established instruments, including a principal survey and teacher survey, were used in this study. The administrator survey tool used for this study was the *Principals' Technology Leadership Assessment* (see Appendix C). The teacher survey tool used for this study was the *Educator Technology Self-Efficacy Survey* (see Appendix D). As both of these instruments were used in prior studies, the original researchers and survey developers had already established high levels of validity and reliability. The researcher of this study specifically chose these two instruments not only due to the high levels of validity and reliability, but also for the close alignment with the International Society for Technology in Education and Standards for Administrators and Teachers, which were the foundational elements of this study.

Based on the 2002 International Society for Technology in Education's National Education Technology Standards for Administrators, or ISTE's NETS-A, the Center for the Advanced Study of Technology Leadership in Education, known as CASTLE,

developed a statistically validated assessment called the *Principals' Technology Leadership Assessment*, which was used by McLeod in 2005 (Metcalf, 2012). The reliability of *Principals' Technology Leadership Assessment* in 2002 was high, with a Chronbach's alpha (α) of 0.95 (Metcalf, 2012). McLeod (2005) also found a high level of internal reliability with the 2002 *Principals' Technology Leadership Assessment* survey tool, which was neither enhanced nor diminished by removal of individual items (Metcalf, 2012).

In 2009, the International Society for Technology in Education, ISTE, updated the NETS-A standards. Due to high levels of validity and reliability in the original instrument, Metcalf (2012) used the 2002 *Principals' Technology Leadership Assessment* as the basis for development of an updated instrument that would reflect the updated 2009 NETS-A. Metcalf (2012) retained the same format by grouping the questions based on the NETS-A subscales, but added a demographics question that pertained to the updated study. For the purpose of this study, the demographic question from Metcalf's 2012 version of the *Principals' Technology Leadership Assessment* was removed and demographic questions related to this study were added. Demographic questions for principals included age, as defined by ten-year age brackets, and years in administration, as defined by ten-year age brackets.

Due to updating the *Principals' Technology Leadership Assessment* to reflect the 2009 National Education Technology Standards for Administrators, or NETS-A, the psychometrics proved to be no longer valid. Metcalf (2012) piloted the updated instrument to establish content validity and improve the questions. The survey tool was pilot with five school administrators outside of the sample population used for the study.

Metcalf (2012) used the pilot respondents' feedback to improve clarity and revise the questions.

In 2014, Gentry, Baker, Thomas, Whitfield, and Garcia developed a statistically reliable and valid survey to determine classroom teachers' level of self-efficacy for modeling twenty-first century skills, known as the *Educator Technology Self-Efficacy Survey*. When the researchers in Gentry's (2014) study began to look for a technology skill-based survey to use that was behavior-specific and aligned with the International Society for Technology in Education teacher standards, there were none to be found (Gentry et al., 2014). In response, the researchers designed a survey tool to that would gauge educators' self-efficacy toward the blending of instructional best practices with twenty-first century technology applications (Gentry et al., 2014). The instrument (see Appendix E) includes five negative behavioral items and five positive behavioral items for each of the five ISTE Standards for Teachers. There was an expert panel used to determine intra-rater reliability for survey items, which was one hundred percent agreement (Gentry et al., 2014). In addition, the survey items had a high level of overall internal consistency as evidenced by a Chronbach's alpha (α) of 0.958 (Gentry et al., 2014).

Data Analysis

Data from this study was analyzed using several statistical treatments. Paired sample t-tests assessed the reliability of mean differences on a continuous variable between two independent groups of people (Pelham, 2013). For this study, the overall principal perception data and corresponding overall teacher perception data was analyzed using a t-test to determine the nature of the relationship between the two groups. To

analyze the impact of specific areas of digital leadership and digital implementation on the overall principal and teacher perception data, a Pearson correlation coefficient was used. The Pearson's formula for the correlation coefficient was appropriate because it correlated nominal and continuous variables by measuring the strength of a linear association between two variables (Pelham, 2013). A one-way ANOVA test was used to determine if the null hypotheses for the demographic sub-questions would be supported. The researcher's goal was to find differences in the overall principal perception data and the specific areas of digital leadership based on the demographics of age and years of experience in administration; therefore, the one-way ANOVA was selected. Likewise, a one-way ANOVA was used to analyze differences in the overall teacher perception data and the specific areas of digital implementation based on the demographics of age and years of experience in education. The one-way ANOVA was selected as the statistical treatment, as it determines whether any of the means differed from one another (Pelham, 2013). In chapter four, the results of this study will be provided; it will be determined if the null hypotheses were accepted or rejected.

Summary

Chapter three focused on the methodology of the study, including details of the method, participants, sampling procedure, research setting, research design, and procedure for data analysis. Validity and reliability of the instrument and study were also provided. In chapter four, the findings from this study will be reported. A summary of the entire study will be given in chapter five, in addition to the implications and recommendations for future study in this area.

Chapter IV

Analysis

Introduction

The intent of this study was to examine the nature of the relationship between a principal's digital leadership and the teachers' digital implementation in his or her school. The demographics of age and years of experience in administration of the principal participants were studied, along with the demographics of age and years of experience in education of the teacher participants. Additionally, the researcher sought to examine the relationship between each of the International Society for Technology in Education Standards for Administrators and the overall ISTE Standards for Administrators. Likewise, the relationships between each of the ISTE Standards for Teachers and the overall ISTE Standards for Teachers were examined.

Research suggests that there is a gap between the current school culture and leadership style and the digital culture and digital leadership style that needs to be addressed in order to support the next generation of learners. School leaders are responsible for leading digital developments and diffusing twenty-first century learning practices into their schools, yet they are experiencing a gap in knowledge and application as they navigate their role as digital leaders (Askal, 2015). With an increase in the focus and allocation of funding on technology, schools need transformational leaders who can facilitate the change and support a digital learning culture for technology integration. After a thorough review of the literature, there was a lack of research found in the area of digital leadership, specifically related to the digital implementation and integration of technology into the school environment.

In this chapter, data will be reported to give insight into the perceptions of Missouri elementary principals toward digital leadership and Missouri elementary teachers toward digital implementation. The following research questions and sub-questions were addressed through the principal and teacher surveys in this study:

1. What is the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and the teachers' digital implementation in his or her school building?
2. What is the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship)?
 - a. Does the demographic of principals' age have an impact?
 - b. Does the demographic of years of experience in administration have an impact?
3. What is the nature of the relationship between elementary teachers' overall perception of their digital implementation and specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership)?
 - a. Does the demographic of teachers' age have an impact?
 - b. Does the demographic of teachers' years of experience in education have an impact?

To address the questions and sub-questions of this study, the researcher made the following hypotheses:

1. There is no statistical significance in the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and the teachers' digital implementation in his or her school building.
2. There is no statistical significance in the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship).
 - a. An elementary principal's overall perception of his or her digital leadership has no statistically significant impact on the specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship) based on demographic of age.
 - b. An elementary principal's overall perception of his or her digital leadership has no statistically significant impact on the specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship) based on demographic of years of experience in administration.
3. There is no statistical significance in the nature of the relationship between the elementary teachers' overall perception of their digital implementation and

specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership).

a. Elementary teachers' overall perception of their digital implementation has no statistically significant impact on the specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership) based on demographic of age.

b. Elementary teachers' overall perception of their digital implementation has no statistically significant impact on the specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership) based on demographic of years of experience in education.

Upon completion of the survey, all responses to the survey instruments were downloaded from Question Pro and uploaded to the IBM Statistical Package for Social Sciences Statistics (SPSS) program for analysis. The final survey results consisted of 618 total respondents, which included 260 principals and 358 teachers. Quantitative analysis was utilized to investigate each of the research questions, while Pearson correlations were

conducted to determine the strength of possible relationships. The resulting correlation matrices showing significance at the .05 level are included in the following narrative. In addition, a paired sample t-test was used to analyze the overall principal perception data and corresponding overall teacher perception data to determine the nature of the relationship between the two groups. To analyze the sub-questions in this study, the one-way ANOVA was the selected statistical treatment. The researcher was looking for statistical significance that attests to the strength of the relationship or leads to predictability in the relationship.

Elementary Principal's Digital Leadership and Teachers' Digital Implementation

To determine the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and the teachers' digital implementation in his or her school building, a Pearson correlation test and paired sample t-tests were performed. Overall, the researcher wanted to see how the two groups—principals and teachers—were related. The Pearson correlation coefficient that was found, $r = .274$, indicated a weak correlation between the two groups. The means for the responses below illustrate the overall perceptions of the respondents. The range of the mean for the principal survey was 1.00 to 5.00, where 1.00 = Not at all, 2.00 = Minimally, 3.00 = Somewhat, 4.00 = Significantly, and 5.00 = Fully. The range of the mean for the teacher survey was 1.00 to 5.00, where 1.00 = Strongly disagree, 2.00 = Agree, 3.00 = Neutral, 4.00 = Agree and 5.00 = Strongly agree. Based on the significance level of $p = .05$, the null hypothesis was accepted. Thus, there is no statistical significance in the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and the teachers' digital implementation in his or her school building.

Elementary Principal's Perceptions of Digital Leadership

To determine the statistical significance between an elementary principal's overall perception of his or her digital leadership and specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship), a Pearson correlation test was used to determine if there was a relationship between each of the ISTE Standards for Administrators and the ISTE Standards for Administrators as a whole. There were strong relationships, with a direct positive correlation, found between all five of the individual ISTE Standards for Administrators and the overall ISTE Standards for Administrators.

When examining principals' perceptions ($N = 276$) of Standard 1: Visionary Leadership, the strength of the association between variables was strong, $r = .824$, and the correlation coefficient, $p = .000$, was found to be significant ($p < 0.001$). When examining principals' perceptions ($N = 244$) of Standard 2: Digital Age Learning Culture, the strength of the association between variables was the strongest, $r = .919$, and the correlation coefficient, $p = .000$, was found to be significant ($p < 0.001$). When examining principals' perceptions ($N = 244$) of Standard 3: Excellence in Professional Practice, the strength of the association between variables was very strong, $r = .915$, and the correlation coefficient, $p = .000$, was found to be significant ($p < 0.001$). When examining principals' perceptions ($N = 244$) of Standard 4: Systemic Improvement, the strength of the association between variables was very strong, $r = .912$, and the correlation coefficient, $p = .000$, was found to be significant ($p < 0.001$). When examining principals' perceptions ($N = 244$) of Standard 5: Digital Citizenship, the strength of the association between variables was strong, $r = .882$, and the correlation

coefficient, $p = .000$, was found to be significant ($p < 0.001$). The individual standards within the ISTE Standards for Administrators strongly correlated with the overall ISTE Standards for Administrators, with a direct positive correlation; therefore, the null hypothesis was rejected. Thus, there is statistical significance in the relationship between an elementary principal's overall perception of his or her digital leadership and specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship).

Demographics of Age and Years of Experience in Administration

To determine the impact of an elementary principal's overall perception of his or her digital leadership on the specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship) based on demographics of age and years of experience in administration, a one-way ANOVA was run. There was no significance found at the alpha level ($p < .05$) for either the demographics of age or years of experience in administration. Therefore, both of the null hypotheses were accepted. Thus, an elementary principal's overall perception of his or her digital leadership has no statistically significant impact on the specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship) based on the demographic of age. Likewise, an elementary principal's overall perception of his or her digital leadership has no statistically significant impact on the specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic

improvement, and digital citizenship) based on the demographic of years of experience in administration.

Elementary Teachers' Perceptions of Digital Implementation

To determine the statistical significance between the elementary teachers' overall perception of their digital implementation and specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership), a Pearson correlation was run. The correlation test was used to determine if there was a relationship between each of the ISTE Standards for Teachers and the ISTE Standards for Teachers as a whole. There were strong relationships, with a direct positive correlation found between all five of the individual ISTE Standards for Teachers and the overall ISTE Standards for Teachers.

When examining teachers' perceptions ($N = 378$) of Standard 1: Facilitate and inspire student learning and creativity, the strength of the association between variables was strong, $r = .883$, and the correlation coefficient, $p = .000$, was found to be significant ($p < 0.001$). When examining teachers' perceptions ($N = 298$) of Standard 2: Design and develop digital age learning experiences and assessments, the strength of the association between variables was the strongest, $r = .918$, and the correlation coefficient, $p = .000$, was found to be significant ($p < 0.001$). When examining teachers' perceptions ($N = 298$) of Standard 3: Model digital age work and learning, the strength of the association between variables was strong, $r = .876$, and the correlation coefficient, $p = .000$, was found to be significant ($p < 0.001$). When examining teachers' perceptions ($N = 298$) of

Standard 4: Promote and model digital citizenship and responsibility, the strength of the association between variables was strong, $r = .856$, and the correlation coefficient, $p = .000$, was found to be significant ($p < 0.001$). When examining teachers' perceptions ($N = 298$) of Standard 5: Engage in professional growth and leadership, the strength of the association between variables was very strong, $r = .903$, and the correlation coefficient, $p = .000$, was found to be significant ($p < 0.001$). The individual standards within the ISTE Standards for Teachers strongly correlated with the overall ISTE Standards for Teachers, with a direct positive correlation; therefore, the null hypothesis was rejected. Thus, there is statistical significance in the relationship between the elementary teachers' overall perception of their digital implementation and specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership).

Demographic of Age

To determine if elementary teachers' overall perception of their digital implementation had a statistically significant impact on the specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership) based on the demographic of age, a one-way ANOVA was run. When examining the teachers' perceptions of digital implementation, as defined by the ISTE Standards for Teachers, and the demographic of age, as defined by 10-year age

brackets, there was significance found with Standard 3, Standard 5, and overall. The teachers' ($N = 341$) perceptions of their implementation of ISTE Standard 3 were associated with statistical significance, $p < .001$, as shown below in Table 1. The teachers' ($N = 333$) perceptions of their implementation of ISTE Standard 5 were associated with statistical significance, $p = .001$, as shown below in Table 2. The teachers' ($N = 289$) perceptions of their overall implementation of ISTE Standards for Teachers were also associated with statistical significance, $p < .05$, as shown below in Table 3.

Table 1: ANOVA for ISTE Standards for Teachers – Standard 3 and Age

	Sum of Squares	df	Mean Square	F
Between Groups	876.865	4	219.216	7.688*
Within Groups	9581.152	336	28.515	
Total	10458.02	340		

* $p < 0.05$

Table 2: ANOVA for ISTE Standards for Teachers – Standard 5 and Age

	Sum of Squares	df	Mean Square	F
Between Groups	827.234	4	206.809	4.625*
Within Groups	12666.41	328	44.715	
Total	15493.65	332		

* $p < 0.05$

Table 3: ANOVA for Overall ISTE Standards for Teachers and Age

	Sum of Squares	df	Mean Square	F
Between Groups	11303.32	4	2825.829	3.877*
Within Groups	206989.7	284	728.837	
Total	218293.1	288		

* $p < 0.05$

To further analyze the significance found in the teachers' perceptions of implementation of Standard 3, Standard 5, and the overall ISTE Standards for Teachers based on the demographic of age, post-hoc comparisons using the Tukey HSD test were run. The participants for Standard 3: Model digital age work and learning, included teachers in the following age brackets: 20-30 ($N = 93$), 31-40 ($N = 112$), 41-50 ($N = 96$), 51-60 ($N = 38$), and 61-70 ($N = 2$). For the demographic of age, the post-hoc Tukey test showed that the 20-30 age group differed significantly at the $p < .001$ level from the 41-50 ($p = .001$) and 51-60 group ($p < .001$), based on Standard 3: Model digital age work and learning. The post-hoc Tukey test showed that the 31-40 age group differed significantly at the $p < .05$ level from the 41-50 ($p < .05$) and 51-60 group ($p < .05$), based on Standard 3: Model digital age work and learning. Those in the age bracket of 20-30 were the strongest models of digital age work and learning, followed by those in the 31-40 age bracket. As age brackets progressed, the strength of the relationships between groups was not significant.

The participants for Standard 5: Model digital age work and learning, included teachers in the following age brackets: 20-30 ($N = 93$), 31-40 ($N = 110$), 41-50 ($N = 91$), 51-60 ($N = 37$) and 61-70 ($N = 2$). For the demographic of age, the post-hoc Tukey test showed that the 20-30 age group differed significantly at the $p < .05$ level from the 41-50 ($p < .05$) and 51-60 group ($p < .05$), based on Standard 5: Engage in professional growth and leadership. Those in the age bracket of 20-30 were the strongest in engaging in professional growth and leadership. As age brackets progressed, the strength of the relationships between groups was not significant.

The participants for the overall ISTE Standards for Teachers, included teachers in the following age brackets: 20-30 ($N = 80$), 31-40 ($N = 194$), 41-50 ($N = 81$), 51-60 ($N = 32$) and 61-70 ($N = 2$). For the demographic of age, the post-hoc Tukey test showed that the 20-30 age group differed significantly at the $p < .05$ level from the 41-50 ($p < .05$) and 51-60 group ($p < .05$), based on the overall ISTE Standards for Teachers. Those in the age bracket of 20-30 were the strongest in their overall perception of the ISTE Standards for Teachers. As age brackets progressed, the strength of the relationships between groups was not significant.

Demographic of Years of Experience in Education

To determine if elementary teachers' overall perception of their digital implementation had a statistically significant impact on the specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership) based on the demographic of years of experience in education, a one-way ANOVA was run. When examining the teachers' perceptions of digital implementation, as defined by the ISTE Standards for Teachers, and the demographic of years of experience in education, as defined by 10-year age brackets, there was significance found with Standard 3, Standard 5, and overall. The teachers' ($N = 344$) perceptions of their implementation of ISTE Standard 3 were associated with statistical significance, $p < .05$, as shown below in Table 4. The teachers' ($N = 336$) perceptions of their implementation of ISTE Standard 5 were associated with statistical significance, $p < .05$, as shown below in Table 5. The teachers' ($N = 290$) perceptions of their overall

implementation of ISTE Standards for Teachers were also associated with statistical significance, $p < .05$, as shown below in Table 6.

Table 4: ANOVA for ISTE Standards for Teachers – Standard 3 and Years in Education

	Sum of Squares	df	Mean Square	F
Between Groups	448.554	3	149.528	5.053*
Within Groups	10061.16	340	29.592	
Total	10509.71	343		

* $p < 0.05$

Table 5: ANOVA for ISTE Standards for Teachers – Standard 5 and Years in Education

	Sum of Squares	df	Mean Square	F
Between Groups	404.914	3	134.971	2.966*
Within Groups	15108.32	332	45.507	
Total	15513.24	335		

* $p < 0.05$

Table 6: ANOVA for ISTE Standards for Teachers and Years in Education

	Sum of Squares	df	Mean Square	F
Between Groups	8980.787	3	2993.596	4.033*
Within Groups	212265.3	286	742.186	
Total	221246.2	289		

* $p < 0.05$

Again, to further analyze the significance found in the teachers' perceptions of implementation of Standard 3, Standard 5, and the overall ISTE Standards for Teachers based on the demographic of years of experience in education, post-hoc comparisons using the Tukey HSD test were run. The participants for Standard 3: Model digital age work and learning, included teachers with the following experience in education, as defined by 10-year age brackets: 1-10 ($N = 167$), 11-20 ($N = 123$), 21-30 ($N = 49$) and

31-40 ($N = 5$). For the demographic of years of experience in education, the post-hoc Tukey test showed that teachers with 1-10 years of experience differed significantly at the $p < .001$ level from the teachers with 21-30 years of experience ($p = .001$), based on Standard 3: Model digital age work and learning. Teachers with 11-20 years of experience differed significantly at the $p < .05$ level from the teachers with 21-30 years of experience ($p < .05$), based on Standard 3: Model digital age work and learning. The teachers with 1-10 years of experience were the strongest models of digital age work and learning, followed by those with 11-20 years of experience in education. As the years of experience brackets progressed, the strength of the relationships between groups was not significant.

The participants for Standard 5: Engage in professional growth and leadership, included teachers with the following experience in education, as defined by 10-year age brackets: 1-10 ($N = 165$), 11-20 ($N = 119$), 21-30 ($N = 48$), and 31-40 ($N = 4$). For the demographic of years of experience in education, the post-hoc Tukey test showed that teachers with 1-10 years of experience differed significantly at the $p < .05$ level from the teachers with 21-30 years of experience ($p < .05$), based on Standard 5: Engage in professional growth and leadership. The teachers with 1-10 years of experience were the strongest in engaging in professional growth and leadership. As the years of experience brackets progressed, the strength of the relationships between the groups was not significant.

The participants for the overall ISTE Standards for Teachers included teachers with the following experience in education, as defined by 10-year age brackets: 1-10 ($N = 143$), 11-20 ($N = 104$), 21-30 ($N = 40$), and 31-40 ($N = 3$). For the demographic of years

of experience in education, the post-hoc Tukey test showed that teachers with 1-10 years of experience differed significantly at the $p < .05$ level from the teachers with 21-30 years of experience ($p < .05$), based on the overall ISTE Standards for Teachers. The teachers with 1-10 years of experience were the strongest in their overall perception of the ISTE Standards for Teachers. As age brackets progressed, the strength of the relationships between groups was not significant.

Summary

In this chapter, the findings of the study were provided. The survey results from the 618 total respondents, which included 260 principals and 358 teachers, were quantitatively analyzed to investigate each of the research questions and determine if the null hypotheses were accepted or rejected. Pearson correlations, paired sample t-tests, and one-way ANOVAs were the statistical treatments used in this study to analyze the overall principal perception data and corresponding overall teacher perception data. Chapter five will provide a summary of the entire study, as well as recommendations for future studies in this area.

Chapter V

Conclusions and Recommendations

Introduction

This study examined the relationship between a principal's digital leadership and the teachers' digital implementation in his or her school. Specific demographics were analyzed, which included the principals' age and years of experience in administration and the teachers' age and years of experience in education. In addition, the relationship between each of the International Society for Technology in Education Standards for Administrators and the overall ISTE Standards for Administrators were examined, as well as the relationships between each of the ISTE Standards for Teachers and the overall ISTE Standards for Teachers. Guiding the overall aim of the study were the following research questions and sub-questions:

1. What is the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and the teachers' digital implementation in his or her school building?
2. What is the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship)?
 - a. Does the demographic of administrators' age have an impact?
 - b. Does the demographic of years of experience in administration have an impact?
3. What is the nature of the relationship between elementary teachers' overall perception of their digital implementation and specific areas of digital

implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership)?

- a. Does the demographic of teachers' age have an impact?
- b. Does the demographic of teachers' years of experience in education have an impact?

Summary of Methods

The researcher collected data for this study from elementary principals and teachers in the state of Missouri. Upon receiving approval from the Research Review Board (RRB) in February of 2017 for this study, the invitation to participate along with the electronic survey were distributed to all elementary principals in the state of Missouri through Question Pro. Principals who chose to participate then forwarded the teacher survey to five teachers who would serve as a representative sample from their school. The researcher used the 2012 *Principals' Technology Leadership Assessment* (Metcalf, 2012) as the tool for measuring principals' perceptions of their knowledge and application of the International Society for Technology in Education (ISTE) Standards for Administrators. For the purpose of this study, the demographic question from Metcalf's 2012 version of the *Principals' Technology Leadership Assessment* was removed and demographic questions related to this study were added. Demographic questions for principals included age, as defined by ten-year age brackets, and years in administration, as defined by ten-year age brackets. To determine teachers' level of self-efficacy for modeling twenty-first century skills, the *Educator Technology Self-Efficacy*

Survey (Gentry, 2014) was used. The *Educator Technology Self-Efficacy Survey* was selected as the teacher instrument in this study due to the strong alignment with the International Society for Technology in Education (ISTE) Standards for Teachers. Demographic questions for teachers were added at the end of the survey, which included age, as defined by ten-year age brackets, and years of experience in education, as defined by ten-year age brackets. The data collected electronically through Question Pro was exported and uploaded into the IBM Statistical Package for Social Sciences Statistics (SPSS) program for analysis. Overall, there were several tests run to analyze the data, which included paired sample t-tests, Pearson correlations, and analysis of variance, or ANOVA.

Limitations, Delimitations and Design Controls

There were several limitations that may have affected the results of this study. The first factor out of the researcher's control was the number of participants who responded to the online survey. With 260 principals and 358 teachers participating in the study, the size of the sample ($N = 618$) was not as large as anticipated. Other limitations of the study were the willingness of the elementary principals to disseminate the online teacher survey to their staff, as well as their own interest in participating in the study. The researcher also did not have control over the participants' technology access available in their classroom, building, and district.

Steps were taken to minimize the effects of the limitations. Design controls were embedded to account for the limitations, delimitations, and assumptions in this study. It was assumed that teachers and principals would respond truthfully to the survey questions. In the online survey introduction, a confidentiality statement was included.

The researcher included the confidentiality information before principals and teachers began the survey to encourage truthful responses from all participants. It was also assumed that participants who took this survey would respond to all questions.

Incomplete surveys were not included in the analysis of the data. To narrow the scope of research, the researcher intentionally limited participation to elementary principals and teachers in the state of Missouri. However, the results of this study are generalizable due to the use of common educational standards throughout the United States, known as the Common Core. Results are also generalizable due to the wide variety of technology used in schools throughout Missouri and the United States.

Summary of Findings

The purpose of this study was to examine the nature of the relationship between a principal's digital leadership and teachers' digital implementation in elementary schools in the state of Missouri. The researcher wanted to shed light on the gap between the current school culture and leadership style and the digital culture and digital leadership style that needs to be addressed in order to support the next generation of learners. The findings for each of the research questions in this study are detailed below.

Elementary Principals' Digital Leadership and Teachers' Digital Implementation

The first research question was as follows: What is the nature of the relationship between an elementary principal's overall perception of his or her digital leadership and the teachers' digital implementation in his or her school building? The nature of the relationship was measured by analyzing the overall results of the principals' perceptions, as compared to the average teachers' perceptions from his or her school. Results

indicated that there was no significance found and the correlation between the two variables, principals' perceptions and teachers' perceptions, was weak.

When examining this data further, the researcher found that principals rated themselves higher in knowledge and application of the ISTE Standards for Administrators than the teachers rated themselves in knowledge and application of the ISTE Standards for Teachers. This led the researcher to believe that the principals' digital knowledge and skills is not trickling down into the digital culture of the school. This would suggest that there is room for improvement in principals' building their teachers' self-efficacy regarding digital implementation to support teaching and learning in the school. It is recommended for principals to find ways to share their knowledge and skills regarding technology with their teachers through modeling and professional development opportunities. The principal is the instructional leader in the school, and digital implementation is an important component of engaging instruction in the twenty-first century.

Elementary Principals' Perceptions of Digital Leadership

The second research question was as follows: What is the nature of the relationship between the elementary principal's overall perception of his or her digital leadership and specific areas of digital leadership (visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship)? Overall, there was a strong and positive relationship found between the principals' perceptions of each of the ISTE Standards for Administrators and the principals' overall perceptions of the ISTE Standards for Administrators. Each of the individual standards within the ISTE Standards for Administrators strongly correlated

with the overall ISTE Standards for Administrators, with a direct positive correlation; therefore, there is statistical significance shown.

Analysis of the strong relationship found between the individual ISTE Standards for Administrators and the ISTE Standards for Administrators as a whole suggests that the International Society for Technology in Education has the right standards in place to guide and direct principals in their role as digital leaders. The strongest correlation was found with Standard 2: Digital Age Learning Culture. This would suggest that it is of the utmost importance for principals to “create, promote and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant and engaging education for all students” (ISTE, 2014, p. 1). To do this, principals should focus on continuous improvement of digital-age learning to ensure innovation, promote and model integrated approaches for using technology, and provide the resources needed to meet the diverse needs of learners (ISTE, 2014). Another strong correlation to note is that of Standard 3: Excellence in Professional Practice. With this standard, ISTE calls for leaders to “promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources” (ISTE, 2014, p. 1). As discussed in the review of literature, principals should utilize Learning Forward’s Standards for Professional Learning (2001) as a framework for providing professional learning opportunities for staff in areas to increase student engagement and academic achievement, specifically including professional development centered on effective technology integration.

Principals who are looking to improve their digital leadership capacity are encouraged to connect with the International Society for Technology in Education to stay

up to date with emerging trends regarding the effective use of technology to support teaching and learning. Opportunities to connect may include, but are not limited to, following ISTE on Twitter, creating a professional learning network (PLN), and signing up for newsletters or attending events hosted by ISTE. While ISTE is not the only source for principal development in the area of technology, it is a highly recognized association that provides a well-researched set of standards to guide administrators in their work.

Demographics of Age and Years of Experience in Administration

The second research question in this study included the following two sub-questions: Does the demographic of administrators' age have an impact, and does the demographic of years of experience in administration have an impact? To analyze these questions, the researcher completed an analysis of variance, or ANOVA. For both demographics of age and years of experience in administration, no significance was found. These findings suggest that principals of any age and in any point in their administrative career have the ability to make a difference in setting the direction for the digital culture in their school.

More important than age or years of experience as an administrator is a principal's ability to lead in a transformational way. This study was grounded in the theory of transformational leadership, as it relates to technology integration and innovation. Principals who have a transformational leadership style empower their teachers and generate a school climate that supports innovation (Sagnak, Kuruoz, Polat, & Soylu, 2015). Transformational leaders create a safe environment so that the staff are inspired and feel empowered to be innovative (Mehdinezhad, 2016). Principals who exhibit transformational leadership qualities play a major role in the fostering of

conditions for school improvement by inspiring and motivating teachers' engagement in professional learning activities, which can impact student achievement (Allen et al., 2015).

In the review of literature, studies of transformational leadership at the school level (Bogler, 2001; Griffith, 2004; Leithwood & Jantzi, 2006) found an impact on teachers' perceptions and behavior (Eliophotou-Menon, 2016). Bass (1999) and Hallinger (2003) discovered that transformational leadership was linked to the commitment of staff to the organization, and positively affected teachers' attitudes toward their school and commitment to change and learning (Eliophotou-Menon, 2016). The work of Bass and Riggio (2006) suggests that transformational leaders inspire their staff to be creative and innovative, while avoiding criticism and embracing mistakes. Based on the current research and findings in this study, it is suggested that principals support teachers with new initiatives and encourage them to take risks as transformational leaders.

Elementary Teachers' Perceptions of Digital Implementation

The third research question was as follows: What is the nature of the relationship between the elementary teachers' overall perception of their digital implementation and specific areas of digital implementation (facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership)? A Pearson correlation test was used to determine if there was a relationship between each of the ISTE Standards for Teachers and the ISTE Standards for Teachers as a whole. There were strong relationships with a direct positive correlation found between all five of the individual ISTE Standards for

Teachers and the overall ISTE Standards for Teachers. Similar to the analysis of the results of the principal survey, analysis of the strong relationship found between the individual ISTE Standards for Teachers and the ISTE Standards for Teachers as a whole suggests that the International Society for Technology in Education also has the right standards in place to guide and direct teachers in using technology for teaching and learning.

Demographics of Age and Years of Experience in Education

The third research question in this study included the following two sub-questions: Does the demographic of teachers' age have an impact, and does the demographic of teachers' years of experience in education have an impact? When examining the teachers' perceptions of digital implementation, as defined by the ISTE Standards for Teachers, and the demographic of age, as defined by 10-year age brackets, there was significance found with Standard 3, Standard 5, and overall. When examining the teachers' perceptions of digital implementation, as defined by the ISTE Standards for Teachers, and the demographic of years of experience in education, as defined by 10-year age brackets, there was also significance found with Standard 3, Standard 5, and overall.

It is critical for principals to be knowledgeable of the ISTE Standards for Teachers so they can promote a digital culture and encourage growth within their teachers during technology implementation. It was found that teachers who are younger with less experience in education rate themselves higher in regard to Standard 3, or modeling digital age work and learning. Principals should consider using these teachers as models for others, as they have a higher level of efficacy in "exhibiting knowledge, skills, and work processes representative of an innovative professional in a global and

digital society” (ISTE, 2008b, p. 1). It is suggested that principals facilitate collaborative opportunities for teachers to share best practices, digital tools, and resources to support innovation—providing specific structures for younger teachers to share their new ideas and technology knowledge with their veteran teacher colleagues.

In the analysis of the impact of Standard 5: Engage in professional growth and leadership, it was also found that younger teachers with less experience have a higher rating in their self-perception of this standard, as compared to more seasoned teachers. The importance of professional growth is mirrored between the principal and teacher results from this study. Principals should be a source of encouragement for teachers to “continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources” (ISTE, 2008b, p. 1).

Again, as principals are looking to improve their digital leadership capacity and their teachers’ level of digital implementation, they ought to connect themselves and their teachers with the International Society for Technology in Education. This will help not only the principal, but also the teachers stay up to date with emerging trends and new technologies. The ISTE Standards for Teachers provide a research-based framework by which teachers can effectively leverage the power of technology to support teaching and learning in the twenty-first century.

Recommendations

The findings from this study support previous research that there is a gap between digital leadership and digital implementation in school, both of which work together to form a digital school culture. According to Askal (2015), school leaders are responsible

for leading digital developments and diffusing twenty-first century learning practices into their schools, yet they are experiencing gaps in knowledge and application as they navigate their role as digital leaders. It is recommended that further research be conducted to analyze the effective practices of principals in supporting teachers with technology. This study was grounded in the theory of transformational leadership, specifically focusing on technology integration and innovation; however, the leadership style of the principals was not analyzed. Further research in the areas of digital leadership and leadership style would be beneficial. Principals who have a transformational leadership style empower their teachers and generate a school climate that supports innovation (Sagnak, Kuruoz, Polat & Soylu, 2015). Therefore, it would be interesting to see if principals with strong digital leadership and a strong digital culture operate under the transformational style of leadership.

The principal serves as the instructional leader who sets the tone for innovative teaching and learning within the school. This study focused on the International Society for Technology in Education's Standards for Administrators and Teachers, but did not include the scope of all of the ISTE Standards. The two sets of ISTE Standards left out of this study were the ISTE Standards for Coaches and the ISTE Standards for Students. Schools across the country are providing support to principals and teachers through technology instructional coaches. It is recommended to conduct further research into the nature of the relationship of the technology coach, as aligned with the ISTE Standards for Coaches. Further research is also recommended to analyze the ISTE Standards for Students. By including students in the scope of the research, there would be an opportunity to analyze the relationship between the adult-centered ISTE Standards

(Administrators, Teachers, Coaches) and the ISTE Standards for Students. Technology is ever-changing; therefore, is it necessary to conduct ongoing updates to the research.

When the ISTE Standards are refreshed and updated in the future, it is recommended that additional research in the area of digital leadership be conducted to keep the body of research up to date.

Summary

The purpose of this study was to examine the nature of the relationship between a principal's digital leadership and teachers' digital implementation in elementary schools in the state of Missouri. In chapter five, the findings for each of the research questions in this study were provided. Through the analysis of this study, it was found that principals rated themselves higher regarding their implementation of the ISTE Standards for Administrators than teachers did of themselves with the ISTE Standards for Teachers.

The researcher concluded that the principals' digital knowledge and skills are not trickling down into the digital culture of the school. This would suggest that there is room for improvement in principals' building their teachers' self-efficacy regarding digital implementation to support teaching and learning, which would strengthen the digital culture in the school. The analysis of the strong relationship between each of the individual ISTE Standards for Administrators and the ISTE Standards for Administrators as a whole suggests that the International Society for Technology in Education has the right standards in place to guide and direct principals in their role as digital leaders.

Likewise, analysis of the strong relationship found between the individual ISTE Standards for Teachers and the ISTE Standards for Teachers as a whole suggests that the

International Society for Technology in Education also has the right standards in place to guide teachers in using technology for teaching and learning.

In this study, the demographics of age and years of experience were analyzed. More important for principals than age or years of experience is their ability to lead in a transformational way. The findings of this study support the need for principals to bridge the gap between teachers with less experience and veteran teachers. In order to do so, it is important for principals to create a safe environment, one where staff members feel empowered to be innovative (Mehdinezhad, 2016). In the future, technology integration will continue to expand and it is critical for principals to be aware of their role as digital leaders, as well as their influence in supporting an innovative culture for their staff, students, parents, and community.

References

- Aksal, F. A. (2015). Are headmasters digital leaders in school culture? *Education and Science*, 40(182), 77-86.
- Alan, B., & Mark, W. (2010). The end of techno-critique: The naked truth about 1:1 laptop initiatives and educational change. *The Journal of Technology, Learning, and Assessment*, 9(6).
- Anderson, R.E., & Dexter, S. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly*, 41(1), 49-82.
- Arokiasamy, A. R., Abdullah, A. G., & Ismail, A. (2014). Correlation between cultural perceptions, leadership style and ICT usage by school principals in Malaysia. *TOJET: The Turkish Online Journal of Educational Technology*, 13(3), 27-40.
- Benedetto, R. (2006). *How do independent school leaders build the educational technology leadership capacity of the school?* Unpublished doctoral dissertation, Drexel University, United States.
- Bernhardt, V. (2015, November). Toward system wide change. *Educational Leadership*, 73(3), 56-59.
- Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of literature. *Eurasia Journal of Mathematics*, 5(3), 235-245.
- Blair, N. (2012, January/February). Technology integration for the new 21st century learner. *Principal*. 8-13.

- Brabec, K., Fisher, K., & Pitler, H. (2004). Building better instruction: How technology supports nine research-proven instructional strategies. *Learning & Leading with Technology*, 31(5), 6-11.
- Brockmeier, L. L., Sermon, J. M., & Hope, W. C. (2005). Principal's relationship with computer technology. *NASSP Bulletin*, 89(643), 45-63.
- Brown, A. (2003). The new followership: A challenge for leaders. *The Futurist*, 68.
- Brown, L. (2014). Best practices of leadership in educational technology. *i-manager's Journal of Educational Technology*, 11(1), 1-6.
- Burns, J. M. (1978). *Leadership*. New York: Harper & Row.
- Cakir, R. (2012). Technology integration and technology leadership in schools as learning organizations. *The Turkish Online Journal of Educational Technology*, 11(4), 273-282.
- Campbell, B. (2012). Innovative leadership: Insights from a learning technologist. *The Quarterly Review of Distance Education*, 13(4).
- Cator, K. In: Toppo, G. (2011, July 25). Making students literate in a digital age. *USA Today*.
- Chandrasekhar, V. (2009). *Promoting 21st century learning: A case study of the changing role of teachers in one-to-one laptop classrooms*. (Doctoral dissertation). Retrieved from Proquest.
- Chang, I. (2011). The effect of principals' technological leadership on teachers' technological literacy and teaching effectiveness in Taiwanese elementary schools. *Educational Technology & Society*, 15(2), 328-340.

- Churches, A. (2008). 21st century pedagogy. Retrieved from <http://edorigami.wikispaces.com/21st+Century+Pedagogy>
- Clarke, G., & Zagarelle, J. (2012) Teachers and technology: A technological divide. *Childhood Education*, 88(2), 136-139.
- Common Core State Standards Initiative. (2017). Retrieved from <http://www.corestandards.org/about-the-standards/frequently-asked-questions/>
- Costa, A. L., & Kallick, B. (1995). *Assessment in the learning organization: Shifting the paradigm*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Creighton, T. B. (2003). *The principal as technology leader*. Thousand Oaks, CA: Corwin Press.
- Damiani, J. j. (2014). Unlocking elementary students' perspectives of leadership. *International Electronic Journal Of Elementary Education*, 6(2), 229-255.
- Darling-Hammond, L., & Sykes, G. (1999). *Teaching as the learning profession: Handbook of policy and practice*. San Francisco: Jossey-Bass.
- Demsky, J. (2012). 7 habits of highly effective tech-leading principals. *THE Journal*. Retrieved from <http://thejournal.com/Articles/2012/06/07/7-habits-of-highly-effective-tech-leading-principals.aspx>
- Denmark, V. (2016). Transformational leadership: A matter of perspective. Retrieved from <http://www.advanc-ed.org/source/transformational-leadership-matter-perspective>

- Dexter, S., Anderson, R. E., & Ronnkvist, A. (2002). Quality technology support; What is it? Who has it? and What difference does it make? *Journal of Educational Computing Research*, 26(3), 287-307.
- Dexter, S., Seashore, K. R., & Anderson, R. E. (2002). Contributions of professional community to exemplary use of ICT. *Journal of Computer Assisted Learning*, 18(4), 489-497.
- Dexter, S. (2011). School technology leadership: Artifacts in systems of practice. *Journal of School Leadership*, 21, 166-189.
- Dyer, J. H., Gregersen, H. B., & Christensen, C. M. (2009). The innovator's DNA: Five "discovery skills" separate true innovators from the rest of us. *Harvard Business Review*, 87(12), 60-67.
- Eliophotou-Menon, M. (2016). The link between transformational leadership and teachers' job satisfaction, commitment, motivation to learn, and trust in the leader. *Academy of Educational Leadership Journal*, 20(3), 12-22.
- Eren, E. S. (2011). Technological leadership behavior of elementary school principals in the process of supply and use of educational technologies. *Education*, 131(3), 625-636.
- Ertmer, P. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration. *Educational Technology Research & Development*, 53(4), 25-39.
- Fox, M. (2011). *Implementing 21st century skills: A paradox in a traditional world of education?* (Doctoral dissertation). Retrieved from Proquest.

- Francis, H. A., & Ezeife, A. N. (2007). Integrating information and communication technology into the school curriculum: A case for professional development models. Retrieved from <http://www.asstudents.unco.edu/students/AE-Extra/2007/4/Ezeife.html>
- Fullen, M. (2001). *Leading a culture of change*. San Francisco, CA: Jossey-Bass.
- Fullen, M. (2007). *The new meaning of educational change* (4th ed.). Columbia University, New York, NY: Teachers College Press.
- Fullen, M. (2008). *The six secrets of change*. San Francisco, CA: Jossey-Bass.
- Garner, B. (2014). Teaching and learning in the digital age: The rules have changed. *The Toolbox: A Teaching and Learning Resource for Instructors*. 12(3).
- Gay, L. R., & Airasain, P. (2003). *Educational research: Competencies for analysis and applications* (7th ed.). Retrieved from <http://libguides.usc.edu/writingguide/quantitative>
- Gentry, J. E., Baker, C., Thomas, B., Whitfield, C., & Garcia, L. (2014). Transforming technology integration: An instrument to measure educator's self-efficacy for modeling 21st century skills. *National Teacher Education Journal*, 7(3), 31-38.
- Gifford, G. T. (2010). A modern technology in the leadership classroom: Using blogs for critical thinking development. *Journal of Leadership Education*, 9(1), 165-172.
- Gosmire, D. & Grady, M. (2007, February). Principal as technology leader. *Principal Leadership*. 16-21.
- Gray, L., Thomas, N., & Lewis L. (2010). *Teachers' use of educational technology in U.S. public schools: 2009* (NCES No. 2010-040). Washington, DC: U.S. Department of Education, National Center for Statistics.

- Gronn, P. (2000). Distributed properties: A new architecture for leadership. *Educational Management and Administration*, 28(3), 371
- Hallinger, P. (2003). Leading educational change: Reflections on the practice of instructional and transformational leadership. *Cambridge Journal of Education*, 33(3), 329-351.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London: Routledge.
- Hayashi, C. A., & Fisher-Adams, G. (2015). Strengthening leadership preparation to meet the challenge of leading for learning in the digital age: Recommendations from alumni. *Educational Leadership and Administration: Teaching And Program Development*, (26)51-67.
- Haycock, K. (1998). Good teaching matters...a lot. *Education Trust*, 3(2), 3-14.
- Hightower, A. M., Delgado, R. C., Lloyd, S. C., Wittenstein, R., Sellers, K., & Swanson, C. B. (2011). Improving student learning by supporting quality teaching: Key issues, effective strategies. *Editorial Projects in Education, Inc.*
- Ho, J. (2016). Influence of organizational context and follower's deposition on the effectiveness of transformational leadership. *International Journal of Organization Theory and Behavior*, 19(3), 308-343.
- International Society for Technology in Education. (2008a). *Essential conditions: Necessary conditions to effectively leverage technology for learning*. Eugene, OR. Retrieved from www.iste.org/standards/nets-for-teachers.aspx

- International Society for Technology in Education (ISTE). (2008b). *International technology standards for teachers*. Retrieved from https://www.iste.org/docs/pdfs/20-14_ISTE_Standards-T_PDF.pdf
- International Society for Technology in Education (ISTE). (2014). *International technology standards for administrators*. Retrieved from http://www.iste.org/docs/pdfs/20-14_ISTE_Standards-A_PDF.pdf
- Jamieson-Proctor, R. M., Burnett, P. C., Finger, G., & Watson, G. (2006). ICT integration and teachers' confidence in using ICT for teaching and learning in Queensland state schools. *Australasian Journal of Educational Technology*. Retrieved from <http://www.ascilite.org/au/ajet/ajet22/jamieson-proctor.html>
- Jimoyiannis, A., & Komis, V. (2007). Teacher development. *Teacher Development*. Retrieved from http://www.ecedu.upatras.gr/services/people/files_publications/TD/JimoyiannisKomis.pdf
- Kelly, F.S., McCain, T., & Jukes, I. (2009). *Teaching the digital generation: No more cookie-cutter high schools*. Thousand Oaks, CA: Corwin.
- Kouzes, J.M., & Posner, B.Z. (2007). *The leadership challenge* (4th ed.). San Francisco, CA: Jossey-Bass.
- Kowch, E. e. (2013). Whither thee, educational technology? Suggesting a critical expansion of our epistemology for emerging leaders. *Techtrends: Linking Research & Practice To Improve Learning*, 57(5), 25-34. doi:10.1007/s11528-013-0688-3

- Laru, J., Naykki, P., & Jarvela, S. (2012). Supporting small-group learning using multiple Web 2.0 tools: A case study in the higher education context. *Internet and Higher Education, 15*, 29-38.
- Learning Forward. (2001). Standards for professional learning: Quick reference guide. Retrieved from <https://learningforward.org/docs/pdf/standardsreferenceguide.pdf>
- Lei, J., & Zhao, Y. (2008). *One-to-one computing: What does it bring to schools?* Journal of Educational Computing Research, 39(2), 97-122.
- Lenhart, A., Madden, M., Purcell, K., Rainie, L., Smith, A., & Zickuhr, K. (2011). Teens, kindness and cruelty on social network sites. *Pew Internet Safety and America Life Project*. Washington, D.C.
- Marx, G. (n.d.). *Twenty-one trends for the 21st century: Out of the trenches and into the future, their profound implications for students, education, communities, and the whole of society*.
- Marzano, R. J., Pickering, D. J., & Pollock, J. E. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Marzano, R., Waters, T. & McNulty, B. (2005). *School leadership that works*. Alexandria, VA: Association for Supervision of Curriculum Development.
- McCandless, J. (2015). U.S. education institutions spend \$6.6 billion on IT in 2015. Retrieved from <http://www.centerdigitaled.com/higher-ed/US-Education-Institutions-Spend-66-Billion-on-IT-in-2015.html>
- McLachlan, K. (2012). *A case study of 21st century skills programs and practices*. (Doctoral dissertation). Retrieved from Proquest.

- McLeod, S., & Richardson, J.W. (2011). The dearth of technology coverage. *Journal of School Leadership, 21*(2), 216-240.
- Mehdinezhad, V., & Mansouri, M. (2016). School principals' leadership behaviours and its relation with teachers' sense of self-efficacy. *International Journal of Instruction, 9*(2), 51-58.
- Metcalfe, W. B. (2012). *K-12 Principals' perceptions of their technology leadership preparedness*. (Doctoral dissertation). Retrieved from Proquest.
- Mirra, D. (2004). *The role of the school superintendent as a technology leader: A delphi study*. (Unpublished doctoral dissertation). Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Moolenaar, N., Daly, A., & Slegers, P. (2010). Occupying the principal position: Examining relationships between transformational leadership, social network position, and schools' innovative climate. *Educational Administration Quarterly, 46*(5), 623-670.
- Moore, D. & McCabe, G. (2006). *Introduction to the practice of statistics*. New York, NY: Freeman and Company.
- Morphew, V. N. (2012). *A constructivist approach to the national educational technology standards for teachers*. International Society for Technology in Education.
- NAESP. (2011). *Using student achievement data to support instructional decision making*. Retrieved from http://www.naesp.org/sites/default/files/Student%20Achievement_blue.pdf

- Nichols, J. (2007). Technology integration model for teachers. Retrieved from <http://www.teach-nology.com/tutorials/integrate/print.htm>
- Niekerk, M. V., & Blignaut, S. (2014). A framework for information and communication technology integration in schools through teacher professional development. *Africa Education Review*, 11(2), 236-253.
- Novak, E., Razzouk, R., & Johnson, T. E. (2012). The educational use of social annotation tools in higher education: A literature review. *Internet and Higher Education*, 15, 39-49.
- Ng, W. L. (2008). Transformational leadership and the integration of information and communications technology into teaching. *The Asia-Pacific Education Researcher Asia*, 17(1).
- Odom, S. F., Jarvis, H. D., Sandlin, M. R., & Peek, C. (2013). Social media tools in the leadership classroom. *Journal of Leadership Education*, 12(1), 34-53.
- Pelgrum, W. J. (2007). *IEA SITES International Report: School conditions for pedagogy and ICT: International Association for the Evaluation of Educational Achievement*. Pretoria: Unisa Press.
- Pelham, B. W. (2013). *Intermediate statistics: A conceptual course*. Thousand Oaks, CA: Sage Publications.
- Penuel, W. (2006). Implementation and effects of one-to-one computing initiatives: A research synthesis. *Journal of Research on Technology in Education*, 329-348.
- Platz, D. L. (1994). Fostering student ownership in learning. *Education*, 114(3), 420-422.
- Prensky, M. (2010). *Teaching digital natives: Partnering for real learning*. Thousand Oaks, CA: Corwin.

- Puckett, R. (2014). Leadership in educational technology. *i-manager's Journal of Educational Technology*, 10(4), 1-5.
- Qualman, E. (2012). *Digital leader: 5 simple keys to success and influence*. New York, NY: McGraw-Hill.
- Reeves, D. B. (2009). *Leading change in your school: How to conquer myths, build commitment, and get results*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Regional Educational Media Center Association of Michigan. (2017). 21 things 4 teachers. Retrieved from <http://www.21things4teachers.net/>
- Ribble, M., & Miller, T. N. (2013). Educational leadership in an online world: Connecting students to technology responsibly, safely, and ethically. *Journal of Asynchronous Learning Networks*, 17(1), 135-143.
- Richardson, J.W., & McLeod, S. (2011). Technology leadership in Native American schools. *Journal of Research in Rural Education*, 26(7), 1-14.
- Richardson, J. W., Bathon, J., Flora, K. L., & Lewis, W. D. (2012). NETS•A scholarship: A review of published literature. *Journal of Research on Technology in Education*, 45(2), 131-151.
- Rotherham, A. J., & Willingham, D. (2009). 21st Century skills: The challenges ahead. *Educational Leadership*, 67, 16-21.
- Sagnak, M., Kuruo, M., Polat, B., & Soylu, A. (2015). Transformational leadership and innovative climate: An examination of the mediating effect of psychological empowerment. *Eurasian Journal of Educational Research*, (60), 149-162.

- Schein, E. H. (2010). The Jossey-Bass business & management series: Organizational culture and leadership (4). Hoboken, NJ: Jossey-Bass
- Schiller, J. (2003). Working with ICT Perceptions of Australian principals. *Journal of Educational Administration*, 41(2), 171-185.
- Schmidt, D., Baran, E., Thompson, A., Mishra, P., Koehler, M., & Shin, T. (2009). Technological pedagogical content knowledge (TPACK): The development and validation of an assessment instrument for preservice teachers. *Journal of Research for Technology in Education*, 42(2), 123-149.
- Schrum, L. & Levin, B. (2009). *Leading 21st century schools*. Thousand Oaks, CA: Corwin.
- Schrum, L., Galizio, L., & Ledesma, P. (2011). Educational leadership and technology integration: An investigation into preparation, experiences, and roles. *Journal of School Leadership*, 21, 241-258.
- Senge, P. (1990). The leader's new work: Building learning organizations. *Sloan Management Review*, 7-21.
- Sharpe, M. E. (2008). *Research methods in public administration and nonprofit management: Quantitative and qualitative approaches* (2nd ed.). Retrieved from <http://libguides.usc.edu/writingguide/quantitative>
- Sheninger, E. In: Toppo, G. (2011, July 25). Making students literate in a digital age. *USA Today*.
- Sheninger, E. C. (2014). *Digital leadership: Changing technology for change-savvy school leaders*. Thousand Oaks, CA: Corwin.

- Siegrist, G. (1999). Educational leadership must move beyond management training to visionary and moral transformational leaders. *Education*, 120(2), 297.
- Silva, E. (2009). Measuring skills for 21st-century learning. *Phi Delta Kappan*, 90(9), 630-634.
- Sincar, M., & Aslan, B. (2011). Elementary teachers' views about school administrators' technology leadership roles. *Gaziantep University Journal of Social Sciences*, 10(1), 571-595.
- Sincar, M. (2012). Challenges school principals facing in the context of technology leadership. *Educational Sciences: Theory & Practice*, 13(2).
- Smith, G. (2011). *Instructional technology leadership ability of the school principal and effective use of technology in the classroom*. (Doctoral dissertation). Retrieved from Proquest.
- Spears, S. (2011). *Technology-enhanced learning: The effects of 1:1 technology on student performance and motivation*. (Doctoral dissertation). Retrieved from Proquest.
- Stuart, L.H., Milles, A.M., & Remus, U. (2009). School leaders, ICT competence and championing innovations. *Computers & Education*, 53(4), 733-741.
- Unal, E., Uzun, A. M., & Karatas, S. (2015). An examination of school administrators' technology leadership self-efficacy. *Croatian Journal Educational*, 17(1), 195-215. doi:10.15516/cje.v17i1.968
- Valdez, G. (2004). *Critical issue: Technology leadership: Enhancing positive educational change*. Retrieved from <http://www.ncrel.org/sdrs/areas/issues/educatrs/leadrshp/le700.htm>

- Vallance, M. (2008). Beyond policy: Strategic actions to support ICT integration in Japanese schools. *Australasian Journal of Educational Technology*, (3).
- Wagner, T. (2008). *The global achievement gap: Why even our best schools don't teach the new survival skills our children need and what we can do about it*. New York, NY: Basic Books.
- Wang, C. (2010). Technology leadership among school principals: A technology-coordinator's perspective. *Asian Social Science*, 6(1), 51-54.
- Whitaker, T. (2003). *What great principals do differently: Fifteen things that matter the most*. Larchmount, NY: Eye on Education.
- White, S. (2009). *Leadership maps*. Englewood, CO: Lead + Learn Press.
- Yu, C., & Durrington, V.A. (2006). Technology standards for school administrators: An analysis of practicing and aspiring administrators' perceived ability to perform the standards. *NASSP Bulletin*, 90(4), 301-317.
- Yun, J.T., & Moreno, J.F. (2006, January/February). College access: K-13 concentrated disadvantage, and the next 25 years of education research. *Educational Researcher*, 35(1), 12-19.
- Zhao, Y., & Bryant, F. L. (2006). Can teacher technology integration training alone lead to high levels of technology integration? A qualitative look at teachers' technology integration after state mandated technology training. *Electronic Journal for the Integration of Technology in Education*.
- Zhao, Y. (2009). *Catching up or leading the way: American education in the age of globalization*. Alexandria, VA: Association of Supervision and Curriculum Development.

Appendix A: Principal Consent to Conduct Research

By clicking “I Agree,” you are giving consent to participate in this research project and understand the following:

Project Background

This project involves gathering data through the Question Pro online survey that follows, and will look into the relationship between a principal’s digital leadership and the teachers’ digital implementation in his or her school building, as measured by the International Society for Technology in Education (ISTE) Standards. The data will be collected for analysis and may be published. You must be at least 18 years of age to participate.

Purpose

The purpose of this study is to determine the nature of the relationship between a principal’s digital leadership and the teachers’ digital implementation in his or her school building, as measured by the International Society for Technology in Education (ISTE) Standards. In addition, the researcher will analyze whether the demographics of age and years of experience in education or administration have an impact.

Voluntary

The survey is entirely voluntary. You may refuse to answer any question or choose to withdraw from participation at any time, without any penalty or loss of benefits to which you are otherwise entitled.

Procedures

Participants will receive an online survey invitation and link to the survey, which will be disseminated via email. This invitation to participate will be sent to all elementary principals in the state of Missouri. As this study seeks to determine the relationship that occurs between two groups, it is necessary to have participation from principals and teachers within the same building. It is necessary to first obtain the principal’s consent to participate in the study before the teacher survey is disseminated. Principals who agree to participate will be instructed to use a random selection method to distribute the teacher survey via email to five teachers; these five teachers will serve as the representative sample for the building.

Duration of Involvement

Participation in this study should take approximately 15 minutes or less. Principals will only take the survey once, which can be completed anywhere due to the nature of the online survey. Following the survey, your participation will be complete once you have disseminated the teacher survey to a random selection of 5 teachers. There is no further involvement necessary. Upon request, any participant will be able to receive a copy of the findings from the researcher.

Benefits

Your participation in this research project will enrich the information base. A clearer understanding of the relationship between principals' digital leadership and teachers' digital implementation will expand the educational administration knowledge base and inform the work of principals as they attempt to improve their leadership skills. Additional potential benefits might include foresight into professional development opportunities that could improve a leader's effectiveness by highlighting strengths and strengthening weaknesses, information about the work of leadership preparation programs, and utilization in selection and recruitment of quality principals.

Risks

This project does not involve any risks greater than those encountered in everyday life.

Confidentiality

Your confidentiality will be maintained in that a participant's name will not appear on the survey or in the published study itself. Principals who participate will have their email addresses automatically collected through Question Pro when they agree to participate in the study. The collection of email addresses is solely for the purpose of linking principal surveys with the corresponding teacher surveys, as the responses from the teachers will be linked to the building principal's email address. Question Pro is a secure, password-protected system that will keep the data from this study safe and confidential. The data will only be reported in aggregate form. While anonymity cannot be guaranteed, confidentiality will be ensured for all participants.

Thank you for your assistance in providing current information regarding the possible relationship between principal's digital leadership and teachers' digital implementation in elementary schools. Your efforts are greatly appreciated. If you have questions regarding this study, please contact me at (816) 457-0277, or jdomeny@sbuniv.edu. You may also contact my Faculty Advisor, Dr. Tammy Condren, at (417) 328-1737, or tcondren@sbuniv.edu.

If you have questions regarding your rights as a participant in research, please feel free to contact the Research Review Board Chair, Herb Hamann, DPT, at (417) 328-1909, or RRB@sbuniv.edu. Thank you in advance for your assistance with this project.

Sincerely,

Jami Domeny, Doctoral Candidate
Southwest Baptist University

Appendix B: Teacher Consent to Conduct Research

By clicking “I Agree,” you are giving consent to participate in this research project and understand the following:

Project Background

This project involves gathering data through the Question Pro online survey that follows, and will look into the relationship between a principal’s digital leadership and the teachers’ digital implementation in his or her school building, as measured by the International Society for Technology in Education (ISTE) Standards. The data will be collected for analysis and may be published. You must be at least 18 years of age to participate.

Purpose

The purpose of this study is to determine the nature of the relationship between a principal’s digital leadership and the teachers’ digital implementation in his or her school building, as measured by the International Society for Technology in Education (ISTE) Standards. In addition, the researcher will analyze whether the demographics of age and years of experience in education or administration have an impact.

Voluntary

The survey is entirely voluntary. You may refuse to answer any question or choose to withdraw from participation at any time, without any penalty or loss of benefits to which you are otherwise entitled.

Procedures

Participants will receive an online survey invitation and link to the survey, which will be disseminated via email. This invitation to participate will be sent to all elementary principals in the state of Missouri. As this study seeks to determine the relationship that occurs between two groups, it is necessary to have participation from principals and teachers within the same building. It is necessary to first obtain the principal’s consent to participate in the study before the teacher survey is disseminated. Principals who agree to participate will be instructed to use a random selection method to distribute the teacher survey via email to five teachers; these five teachers will serve as the representative sample for the building.

Duration of Involvement

Participation in this study should take approximately 15 minutes or less. Teachers will only take the survey once, which can be completed anywhere due to the nature of the online survey. Following the survey, your participation will be complete. There is no further involvement necessary. Upon request, principals will be able to receive a copy of the findings from the researcher.

Benefits

Your participation in this research project will enrich the information base. A clearer understanding of the relationship between principals’ digital leadership and teachers’

digital implementation will expand the educational administration knowledge base and inform the work of principals as they attempt to improve their leadership skills. Additional potential benefits might include foresight into professional development opportunities that could improve a leader's effectiveness by highlighting strengths and strengthening weaknesses, information about the work of leadership preparation programs, and utilization in selection and recruitment of quality principals.

Risks

This project does not involve any risks greater than those encountered in everyday life.

Confidentiality

Your confidentiality will be maintained in that a participant's name will not appear on the survey or in the published study itself. Principals who participate will have their email addresses automatically collected through Question Pro when they agree to participate in the study. Teacher email addresses will not be collected in this study. The collection of principals' email addresses is solely for the purpose of linking principal surveys with the corresponding teacher surveys, as the responses from the teachers will be linked to the building principal's email address. Question Pro is a secure, password-protected system that will keep the data from this study safe and confidential. The data will only be reported in aggregate form. While anonymity cannot be guaranteed, confidentiality will be ensured for all participants.

Thank you for your assistance in providing current information regarding the possible relationship between principal's digital leadership and teachers' digital implementation in elementary schools. Your efforts are greatly appreciated. If you have questions regarding this study, please contact me at (816) 457-0277, or jdomeny@sbuniv.edu. You may also contact my Faculty Advisor, Dr. Tammy Condren, at (417) 328-1737, or tcondren@sbuniv.edu.

If you have questions regarding your rights as a participant in research, please feel free to contact the Research Review Board Chair, Herb Hamann, DPT, at (417) 328-1909, or RRB@sbuniv.edu. Thank you in advance for your assistance with this project.

Sincerely,

Jami Domeny, Doctoral Candidate
Southwest Baptist University

Appendix C: Survey Instrument 2009 PTLA

Principals Technology Leadership Assessment ver. 2009 NETS•A

You are being given this technology leadership assessment at the request of the researcher in partial fulfillment of the degree of Doctor of Education in Educational Leadership at Southwest Baptist University. Assessment items are based on the 2009 International Society for Technology in Education (ISTE)'s National Educational Technology Standards for Administrators.

The individual items in the assessment ask you about the extent to which you are prepared to engage in certain behaviors that relate to K-12 school technology leadership. As you answer the questions, think of your actual behavior over the course of the last school year (or some other fixed period of time). Do not take into account planned or intended behavior. As you select the appropriate response to each question, it may be helpful to keep in mind the performance of other building leaders that you know. ***Please note that the accuracy and usefulness of this assessment is largely dependent upon your candor.***

1. Do you give consent to participate in this survey? If yes, move on to question 2. If no, stop the survey.

I. Visionary Leadership

2. To what extent are you prepared to facilitate a change that maximizes learning goals using digital resources?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

3. To what extent are you prepared to engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

4. To what extent are you prepared to promote programs and funding to support implementation of technology-infused plans?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

II. Digital Age Learning Culture

5. To what extent are you prepared to ensure instructional innovation focused on continuous improvement of digital learning?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

6. To what extent are you prepared to model and promote the frequent and effective use of technology and learning resources to meet the diverse needs of all learners?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

7. To what extent are you prepared to provide learning environments with technology and learning resources to meet the diverse needs of all learners?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

8. To what extent are you prepared to ensure effective practice in the study of technology and its infusion across the curriculum?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

9. To what extent are you prepared to promote and participate in learning communities that stimulate innovation, creativity, and digital collaboration?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

III. Excellence in Professional Practice

10. To what extent are you prepared to allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

11. To what extent are you prepared to facilitate and participate in learning communities that stimulate and support faculty in the study and use of technology?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

12. To what extent are you prepared to promote and model effective communication and collaboration among stakeholders using digital-age tools?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

13. To what extent are you prepared to stay up-to-date on educational research and emerging trends of effective technology and encourage new technologies to improve student learning?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

IV. Systemic Improvement

14. To what extent are you prepared to lead purposeful change to reach learning goals through the use of technology and media-rich resources?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

15. To what extent are you prepared to collaborate to establish metrics, collect and analyze data, and share findings and results to improve staff performance and student learning?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

16. To what extent are you prepared to recruit highly competent personnel who use technology to advance academic and operational goals?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

17. To what extent are you prepared to establish and leverage strategic partnerships to support systemic improvement?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

18. To what extent are you prepared to establish and maintain a robust infrastructure for technology to support management, operations, teaching, and learning?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

V. Digital Citizenship

19. To what extent are you prepared to ensure access to appropriate digital tools and resources to meet the needs of all learners?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

20. To what extent are you prepared to promote, model, and establish policies for safe, legal, and ethical use of digital information and technology?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

21. To what extent are you prepared to promote and model responsible social interactions related to the use of technology and information?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

22. To what extent are you prepared to model and facilitate the development of a shared cultural understanding and involvement of global issues through communication and collaboration tools?

Not at all	Minimally	Somewhat	Significantly	Fully
1	2	3	4	5

VI. Demographics

23. What is your age? 20-30; 31-40; 41-50; 51-60; 61-70

24. How many years have you been in administration? 1-10; 11-20; 21-30; 31-40; 41-50

Appendix D: Survey Instrument for Teachers

Educator Technology Self-Efficacy Survey (ETS-ES)

The ETS-ES may be used and modified by non-profit educational researchers reviewing instructional technology issues within schools today. The researchers request this manuscript be cited properly in any publications and presentations using the ETS-ES.

<http://www.learningwithjamesgentry.com/ets-es.html>

Indicate your agreement with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I empower my students to demonstrate their creative thinking by using digital tools to generate new ideas and develop innovative products and processes.					
I am able to develop technology-enriched learning environments that enable all students to pursue individual curiosities in an active setting.					
I regularly involve my students in activities where they use digital tools to plan and manage projects focused on real life events and problems.					
I find it challenging to promote student reflections using collaborative tools.					
I allow my students to only use digital tools that I myself feel comfortable with.					
I am unsure of how to set up a classroom where students can express themselves using technology.					
I actively involve my students in an ongoing examination of their thought processes and patterns, and					

believe collaborative tools enable them to clarify understanding with each other.					
I find it difficult to model collaborative learning for my students.					
I find it challenging to help my students find and use digital tools to solve real-world problems.					
I know how to work with students, colleagues, and others both in face-to-face and virtual environments to model the collaborative knowledge construction process.					
I am not aware of digital tools that allow students to take charge of and manage their own learning in terms of exploring curiosities, setting learning goals and learning strategies, and assessing their own progress.					
I am confident in my ability to collect, analyze, and report data on my student's performance in order to improve my own instruction.					
I am confident in customizing and personalizing learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources.					
I feel overwhelmed when asked to integrate digital tools to promote student learning and creativity.					
I train my students to use digital tools to independently manage their own learning					

objectives, plan their learning strategies, and assess their own progress and results.					
I struggle to provide students with multiple and varied assessments that are aligned with both the content and the technology standards.					
I feel challenged and overwhelmed when I try to incorporate digital tools to personalize learning activities.					
I am confident in my ability to design authentic learning experiences that incorporate contemporary tools and resources.					
I feel a sense of engagement and satisfaction when designing or adapting learning experiences that incorporate digital tools to promote student learning and creativity.					
I am unsure of how I can use digital tools and resources to design authentic learning experiences for my students.					
I would describe myself as an innovative educator.					
My prior learning has prepared me to use digital tools to collaborate with students, colleagues, and parents.					
I feel as though I do not have the time I need to communicate effectively with students, parents, and peers using digital age media.					
My lack of technology skills may hinder my ability to acquire and keep pace with					

new technological advances in the future.					
I value the use of digital tools to locate, analyze, evaluate, and use resources to support researching, teaching, and learning.					
I tell students that it's important to use digital tools to locate, analyze, evaluate and use resources to support their own researching and learning, but don't typically practice this in my own teaching.					
I am confident that the technology skills I have today will help me acquire new skills in the future.					
I feel as though I lack the knowledge and skills I need to teach in our global and digital society.					
I feel confident in my ability to effectively communicate relevant information to students, parents, and peers using a variety of digital age media.					
I feel like it's a struggle to use digital tools to communicate and collaborate with colleagues, parents, students, and members of the community to support learning in my classroom.					
I rarely use digital communication tools for my students to interact with other students for online discussions and project teamwork.					
I struggle to provide equitable access to digital					

tools, curriculum, and online resources.					
I feel as though I model and exhibit legal and ethical behavior in our evolving digital culture.					
I am unsure of the rules of online etiquette (netiquette) and how to appropriately interact with others online.					
I do not regularly teach my students safe, legal, and ethical use of online information with regard to author's rights, copyright issues, privacy, cyber bullying, and securing data.					
I routinely integrate digital communication and collaboration tools for my students to engage with students from other cultures.					
I frequently model digital etiquette (netiquette) and online social interaction responsibilities.					
I am continually considering and addressing different student needs, including access to software, hardware, curriculum, and online resources.					
I do not fully understand the local and global societal issues and responsibilities in our evolving digital culture.					
I actively promote, model, and teach the safe, legal and ethical use of online information, including author's rights, copyright issues, privacy, cyber bullying, and securing data.					
I have been described as a good role model for infusing technology into teaching.					

I consistently engage in professional development that enables me to be confident in demonstrating effective use of digital tools in my classroom.					
I sometimes feel overwhelmed when attempting to improve my professional practice by integrating digital tools and resources.					
I am somewhat resistant to change, and therefore am slower to integrate a new tool into my teaching until I have seen evidence of effectiveness.					
I don't always keep up with trends in the research for practical effectiveness of current and emerging digital tools for teaching and learning.					
I participate in several different "informal learning communities/networks" in which I seek ways to learn and grow with new tools for promoting student creativity and collaboration.					
I struggle to join or maintain any informal learning communities/networks for learning new digital tools for teaching and learning.					
I rarely discuss educational technology tools and resources with my colleagues.					
I continually evaluate research trends on the practical effectiveness of current and emerging digital tools for teaching and learning.					

I demonstrate and discuss with my colleagues the effective use of digital resources to improve student learning and the profession of teaching.					
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Demographics

23. What is your age? 20-30; 31-40; 41-50; 51-60; 61-70

24. How many years have you been in education? 1-10; 11-20; 21-30; 31-40; 41-50