

Spring 2012

K-12 Principals' Perceptions of Their Technology Leadership Preparedness

Wendy Burns Metcalf

Follow this and additional works at: <https://digitalcommons.georgiasouthern.edu/etd>

Recommended Citation

Metcalf, Wendy Burns, "K-12 Principals' Perceptions of Their Technology Leadership Preparedness" (2012). *Electronic Theses and Dissertations*. 400.
<https://digitalcommons.georgiasouthern.edu/etd/400>

This dissertation (open access) is brought to you for free and open access by the Jack N. Averitt College of Graduate Studies at Georgia Southern Commons. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of Georgia Southern Commons. For more information, please contact digitalcommons@georgiasouthern.edu.

K-12 PRINCIPALS' PERCEPTIONS OF THEIR TECHNOLOGY LEADERSHIP
PREPAREDNESS

by

WENDY BURNS METCALF

(Under the Direction of Teri Denlea Melton)

ABSTRACT

Adopting technology in the K-12 classroom has moved from adapting lessons that highlight a technology to pervasive use of interactive and handheld devices. This instruction-technology connection creates high expectations to engage today's learners and transform education to support 21st century skills. School leaders have the complex task of incorporating technologies to enhance teaching and learning. The 2009 NETS-A standards were used to define the dimensions of leader preparedness for a technology-rich environment. The research design used a quasi-experimental quantitative study to identify leaders' perceptions of technology leadership preparedness and to determine the impact of one program, the Quality-Plus Leader Academy (QPLA), on leaders' perceptions. Principals from a large Southeastern U.S. school district were surveyed. Data were analyzed using descriptive statistics and a one-way multivariate analysis of variance. The findings showed that principals' highest perceptions of technology leadership preparedness were for the 2009 NETS-A subscale digital citizenship. The subscale visionary leadership had the lowest mean score. There was a statistically significant difference of technology leadership preparedness perceptions between QPLA and non-QPLA participants, where QPLA participants perceived higher levels of preparedness on all five subscales.

INDEX WORDS: Technology leadership, Leader preparation, Technology-rich environment, 2009 NETS-A, Quality-Plus Leader Academy, Principals

K-12 PRINCIPALS' PERCEPTIONS OF THEIR TECHNOLOGY LEADERSHIP
PREPAREDNESS

by

WENDY METCALF

B.S.Ed. Mathematics Education, University of Georgia, 1990

M.Ed. Mathematics Education, University of Georgia, 1996

Ed.S. Instructional Technology, University of Georgia, 1998

A Dissertation Submitted to the Graduate Faculty of Georgia Southern University in

Partial Fulfillment of the Requirements for the Degree

DOCTOR OF EDUCATIONAL LEADERSHIP

STATESBORO, GEORGIA

2012

© 2012

WENDY BURNS METCALF

All Rights Reserved

K-12 PRINCIPALS' PERCEPTIONS OF THEIR TECHNOLOGY LEADERSHIP
PREPAREDNESS

by

WENDY BURNS METCALF

Major Professor: Teri Denlea Melton
Committee: Linda M. Arthur
Paul M. Brinson, Jr.

Electronic Version Approved:
May 2012

DEDICATION

The work presented here is dedicated to my loving and supportive family.

First, I dedicate this work to my grandfathers who served as K-12 teachers and leaders. They passed down their servant leader gene to me and I am proud to carry on their legacy of serving K-12 schools and students.

Next, I dedicate this work to my parents, Joseph and Carole Burns. I have been extremely fortunate to have parents that have instilled a sense in me that “I can accomplish anything”. My parents raised me with a high level of self-confidence that has served me well. I thank them for infusing this belief in me which paved the way for a former mathematics teacher with insecurities about writing to tackle a doctoral dissertation.

Finally, I dedicate this work to my dear husband, Todd. He is my “Prince Charming”, my biggest fan and the reason for my happiness. His love and support through this process have given me strength to persevere and the confidence to stay calm through tough times.

I am a bear of very little brain and long words bother me.

-Winnie the Pooh

ACKNOWLEDGMENTS

I would like to thank Dr. Teri Denlea Melton, my committee chair, for her leadership, guidance and support through the process of conducting this research project. Both her encouraging words and kick-in-the-pants have been a great motivation to me during the course of this journey. I will always treasure her grace and professionalism.

The advice and thoughtful insights of my committee members, Dr. Linda M. Arthur and Dr. Paul Brinson, were of tremendous benefit to me, and to my research. I appreciate their service to me and to the educational community as they so generously gave of their valuable time and expertise.

I owe a debt of gratitude to my car mates, Dr. Alexis Smith, Dr. Debbie Collins, and our 2nd half recruit, Dr. Eric Schexnaildre. Our miles on the road to and from class were so beneficial to the depth of my knowledge and the richness of my research. Our monthly dissertation weekends are the sole reason I was able to stay on track and complete this monumental milestone.

The expertise and support of Dr. Anne Atkins, Dr. Colin Martin, and Dr. Carol Thurman provided a non-threatening line of communication that deepened my understanding and greatly improved the quality of my work. Your assistance with APA formatting and statistical analysis greatly reduced my anxiety level throughout the study. Thank you for punctuating my work with excellence.

One of the most valuable support structures for this endeavor is my great friend, Dr. Paul Johnson. His doctoral journey inspired me to take the leap into the program. Our talks over coffee, pancakes, and chocolate fondue were necessary for my personal

sanity and endurance during my journey. I am so grateful that you are always there to support my (what seems to most as “crazy”) endeavors.

It's kind of fun to do the impossible.

-Walt Disney

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	vii
LIST OF TABLES	xii
LIST OF FIGURES	xiii
CHAPTER	
1 INTRODUCTION	1
Statement of the Problem	4
Research Questions	5
Significance of the Study	5
Procedures	6
Limitations, Delimitations and Assumptions	7
Definition of Terms	7
Chapter Summary	10
2 REVIEW OF LITERATURE	12
Introduction	12
Inspiring a Vision for the Power of Technology	12
Allocating Resources for Technology	14
The Role of the Principal	16
Leader Preparation	19
Supplemental Leadership Programs	26
Quality-Plus Leader Academy	27
Technology Leadership Skills	30

	Technology Leadership Studies	37
	Chapter Summary	44
3	METHODOLOGY	46
	Research Questions	46
	Research Design	47
	Sample and Sampling	47
	Instrumentation	48
	Data Collection	50
	Data Analysis and Reporting	50
	Chapter Summary	51
4	REPORT OF DATA AND DATA ANALYSIS	52
	Research Questions	53
	Research Design	53
	Respondents	54
	Findings	55
	Response to Research Question	64
	Chapter Summary	66
5	SUMMARY, CONCLUSIONS, AND IMPLICATIONS	68
	Summary	68
	Discussion of Findings	69
	Technology Leadership Preparedness	69
	Quality Plus Leader Academy Impact	71

Conclusions	72
Implications for Administrators	73
Recommendations	73
Implementing the Results of the Study	73
Further Research.....	74
Dissemination.....	75
REFERENCES	76
APPENDICES	82
A 2009 ISTE NETS-A	83
B Permission to modify 2002 PTLA	86
C Survey Instrument- 2009 PTLA.....	87
D Georgia Southern University IRB Approval.....	91

LIST OF TABLES

	Page
Table 1: Descriptive Statistics for All Respondents	56
Table 2: Ranked Mean Scores for All Respondents	59
Table 3: Perceived Technology Preparedness by QPLA Participation	62
Table 4: Multivariate Analysis of Variance	63
Table 5: Analysis of Variance.....	64

LIST OF FIGURES

	Page
Figure 1: Educational Technology Leadership Model.....	31
Figure 2: Comparison of 2002 NETS-A and 2009 NETS-A Subscales	36

CHAPTER 1

INTRODUCTION

On the bus ride to the first day of school, Lagitid received a text from her mom with words of encouragement. She spent a few minutes feeding her digital pet, iFluffy, and tweeting to her *screenager* cousin who was headed to school in another part of the country. Before the bus arrived at the school, Lagitid composed a new ringtone using the sounds from the bus and assigned it to the school phone number.

At the same time, Lagitid's school principal, Dr. Lotech, greeted the staff at an early morning faculty meeting to start the day. He handed out updated roster sheets as the teachers entered and asked them to post the paper outside their doors to help students find their way. He reminded them to turn in completed student contact forms, and to place a completed attendance sheet in his mailbox before leaving for the day.

Although both were preparing for the same day of school, Lagitid and Dr. Lotech used completely different tools to create, collaborate, and communicate. Prensky (2010) labeled people like Lagitid and Dr. Lotech as *digital natives* and *digital immigrants*, respectively. The term digital native describes individuals who have always had technology in their lives. Digital immigrants are defined by the fact that technology impacted their lives in progress. Both have embarked on the same first day of school with very different productivity tools.

Dr. Lotech effectively planned and prepared for a traditional day of school. However, Lagitid came to school with new tools and expectations that are unfamiliar to today's leaders. Dr. Lotech's leader preparation was not designed with digital natives in

mind. Recently, national educational organizations recognized this gap and have encouraged change.

Today's students are plugged in to an engaging multimedia world powered by technology. This connection has created high expectations for technology to engage today's learners and transform education to support 21st century skills. School leaders have the complex task of incorporating technology to enhance teaching and learning. Leaders must navigate multiple complex responsibilities to ensure that technology is available and safe for student and teacher use; however, leaders must also participate in technology use preparation so they can use the 21st century technology as well as encourage its use.

Today's students have grown up immersed in technology. Schools are responding to the demands to provide more engaging and collaborative technologies for students and staff (Allen, 2011; Black, 2011; Gosmire & Grady, 2007; Prensky, 2010). Many studies and theorists agree that leadership is the most important factor in effective school change (Leithwood & Riehl, 2005; Stronge, Richard, & Catano, 2008), including change brought about by technology (Dexter, 2008; Fletcher, 2009; Gosmire & Grady, 2007; Grey-Bowen, 2010; Macaulay, 2009; Redish & Chan, 2007). Specifically, the principal's role in visionary leadership, modeling best practices, and support for instructional technology is key to successful technology integration (Gosmire & Grady 2007).

However, often school leaders have not been prepared to support this ever-changing technology-rich environment (Bush, 2008; Levine, 2005). In addition to this lack of preparedness, administrators have other technology leadership concerns (Grey-Bowen, 2010; Macaulay, 2009; Redish & Chan, 2007). Traditional leader preparation

programs do not address the skills needed to support a technology-rich environment (Mitgang, 2008; Young, 2010). The need to better prepare principals has prompted public school districts, states, and private organizations to develop supplemental leader preparation programs.

In an effort to provide guidance in the area of technology leadership, the International Society of Technology Education developed educational technology standards aimed at administrators called NETS-A (ISTE, 2009). In 2002, ISTE developed the National Educational Technology Standards for Administrators (NETS-A) and recently updated the standards in 2009. This study used the 2009 NETS-A framework to determine leaders' perceptions of their level of preparedness for a technology-rich environment. Furthermore, the study determined the impact of a nationally recognized supplemental leader preparation program, QPLA, on perceptions of technology leadership preparedness.

Prior research builds a case for more in depth study of technology leadership. Specifically, it is necessary to determine how to best prepare leaders for the technology age (Ertmer et al., 2002; Macaulay, 2009). According to Langlie (2008), Macaulay (2009), and Redish and Chan (2007), there is a need to incorporate new skills in leadership programs to better prepare for today's technology-rich environment. The studies using the 2002 NETS-A recommended further study based on the newly revised 2009 NETS-A (Grey-Bowen, 2010; Langlie, 2008; Macaulay, 2009; Redish & Chan, 2006).

Considering the prior studies and the reported shortfall of leader preparation, this study utilized the updated 2009 NETS-A to explore the perceptions of K-12 principals

technology leadership preparedness and the impact of participation in the Quality-Plus Leader Academy.

Statement of the Problem

Today's students are plugged-in to an exciting multimedia world powered by technology. This connection creates high expectations for technology to engage today's learners and transform education to support 21st century skills. School leaders have the complex task of incorporating technology to enhance teaching and learning. Leaders must ensure that technology is available for student and teacher use; however, leaders must also participate in technology use preparation so they can use the 21st century technology as well as encourage its use. As the Director of School Technology for one of the largest school systems in the nation, the researcher has seen leaders struggle with these issues.

Studies have identified leaders' strengths and weaknesses in technology leadership; to date, these studies relied on the 2002 ISTE NETS-A as the nationally recognized technology leadership skills. None of the studies reference the newly updated 2009 ISTE NETS-A. Additionally, there is no information about the impact of a leader preparation program that specifically includes technology leadership as part of its curriculum. Therefore, the purpose of this study was to determine the perceptions leaders have of their technology leadership preparedness based on the 2009 ISTE NETS-A. The independent variable was defined as participation in one specific program that included technology leadership in the curriculum. The dependent variable was defined as the preparation level reported by the population.

Research Questions

The study was guided by the overarching research question: What is the perceived technology leadership preparedness level of Walt County (a pseudonym) administrators as measured by their understanding of the 2009 ISTE NETS-A standards? In addition, the following sub-question will add clarity:

1. How do technology leadership preparedness perceptions differ between principals who attended the Quality-Plus Leader Academy and those who did not, across the five NETS-A themes: visionary leadership, digital age culture, excellence in professional practice, systemic improvement, and digital citizenship?

Significance of the Study

The study of school leaders' preparedness for a technology-rich environment is important for several reasons. An effective K-12 building principal is crucial to effecting change and improving student achievement. Principals have a wide variety of administrative and managerial tasks to perform, including school technology integration.

Often, leaders are not adequately prepared for technology leadership. ISTE's NETS-A provides a nationally recognized set of standards and performance indicators for school leaders. In addition, supplemental leader programs are offering ways to mitigate the gap between traditional leader preparation and the workplace needs.

First, this study adds to the body of research regarding leader preparation for technology leadership by using the 2009 NETS-A framework as opposed to the 2002 NETS-A. The updated NETS-A framework represented a shift from operational and tactical standards in 2002 to more strategic and leadership standards in 2009. The NETS-

A framework provides national standards that guide formulation and practice of technology leadership.

Second, the results of the study identify the impact of one supplemental leader program, Quality-Plus Leader Academy (QPLA), on leaders' perceptions of their technology leadership preparedness. QPLA is a nationally recognized leadership program designed to supplement traditional leader preparation. The district-designed program included technology leadership skills in the curriculum.

Identifying the impact of QPLA informs other leader preparation programs as to which components of QPLA should be improved or replicated. Knowing which technology leadership skills are strengths and weaknesses help identify areas to guide continuous improvement. Having better prepared principals provides the technology leadership needed to serve today's students and support the ever-changing technology-rich environment.

Procedures

The purpose of this study was to explore the perceptions principals have of their technology leadership preparedness. The researcher conducted an anonymous quasi-experimental quantitative study to identify principals' perceptions of technology leadership preparedness and determine the impact of the Quality-Plus Leader Academy on principals' perceptions vis-à-vis the PTLA survey.

Respondents were K-12 building principals from a large Southeastern U.S. school district. This district used a supplemental leader preparation program, Quality-Plus Leader Academy, to enhance traditional leader preparation. At the time of the study, 54% of the surveyed principals had participated in the Quality-Plus Leader Academy.

Technology leader preparation skills have been defined by the 2009 NETS-A standards. The researcher used descriptive and inferential statistics to convey the results of the study.

Limitations, Delimitations, and Assumptions

As with any research, there are limitations inherent in this study. A limitation for this study was that the sample population consists only of principals in one Southeastern U.S. school district. Other districts will need to consider the culture and climate of the participating district when interpreting results. Another limitation of the study is the absence of a statistically valid and reliable survey based on the 2009 NETS-A. However, the researcher modeled the survey after the Principals Technology Leadership Assessment based on the 2002 NETS-A, and piloted the survey using the 2009 NETS-A.

A delimitation of this study is that the researcher chose a school district that supplements formal leader preparation with the Quality-Plus Leader Academy. The sample population was a pre-defined group of participants which was beyond the control of the researcher.

It was assumed that the respondents were open and honest in their survey responses. It was also assumed that the survey instrument measured what it was intended to measure.

Definition of Terms

The following terms were defined for this study.

Digital age learning culture. Digital age learning culture is defined as a learning environment that provides a rigorous, relevant, and engaging education for all

students (ISTE, 2009). For the purpose of this study, a digital-age learning culture is defined as a subscale score on the 2009 PTLA.

Digital citizenship. Digital citizenship is defined as the understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture (ISTE, 2009). For the purpose of this study, a digital citizenship was defined as a subscale score on the 2009 PTLA.

Digital immigrant. A digital immigrant is defined as one who has grown up without using technology or without having technology. A digital immigrant moved into a technology world later in life and is learning the language and culture of technology (Prensky, 2010).

Digital native. A digital native is defined as an individual who has grown up immersed in technology. Digital natives utilize technology for communication, research, and exploration of the world in an entirely new way (Prensky, 2010).

Educational leader. An educational leader is a principal in the K-12 school environment. For the purpose of this study, educational leader is used interchangeably with leader, administrator, and principal.

Educational leader preparation. Educational leader preparation includes traditional educational programs provided by accredited colleges and universities that lead to professional certification in Educational Administration. Programs developed and offered by school districts or other national organizations are also included in this definition.

Excellence in professional practice. Excellence in professional practice is defined as a leader who promotes an environment of professional learning and innovation that

empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources (ISTE, 2009). For the purpose of this study, excellence in professional practice was defined as a subscale score on the 2009 PTLA.

Leader preparedness. For the purpose of this study, leader preparedness was defined as a subscale score on the 2009 PTLA.

National Educational Technology Standards for Administrators (NETS-A). NETS-A is a nationally recognized set of standards developed by the International Society of Technology Education. The standards provide guidance to school leaders to effectively support technology in schools (ISTE, 2009).

Quality-Plus Leader Academy (QPLA). QPLA is a year-long academy designed to train and develop school principals with a curriculum created and developed by system leaders. The program covers topics such as curriculum, budget, facilities and operations, technology, and community relations (Cheney, 2010).

Systemic improvement. Educational Administrators provide digital-age leadership and management to continuously improve the organization through the effective use of information and technology resources (ISTE, 2009). For the purpose of this study, systemic improvement was defined as a subscale score on the 2009 PTLA.

Technology leadership. Technology leadership is defined as tasks and inclinations of the principal that support effective instructional technology integration (McLeod, 2005).

Technology-rich environment. A technology-rich environment consists of ubiquitous access to technology for students and staff. This includes access to information,

administrative technologies, and instructional technologies. This definition includes but is not limited to computers, interactive whiteboards, student response systems, digital content systems, student information systems, parent dashboards, electronic mail, video-conferencing, social networking web-sites, and hand-held learning devices (Halpirn, 2011).

Visionary leadership. Visionary leadership is defined as a principal who leads development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization (ISTE, 2009). For the purpose of this study, visionary leadership was defined as a subscale score on the 2009 PTLA.

Chapter Summary

Today's students have grown up immersed in technology. Schools are responding to demands to provide more engaging and collaborative technologies for students and staff. However, often school leaders have not been prepared to support this technology-rich environment, and many traditional leader preparation programs do not address the skills needed to support a technology-rich environment. In an effort to provide guidance for technology leadership, ISTE developed NETS-A, educational technology standards targeting administrators.

The purpose of this study was to determine principals' perceptions of their level of preparedness for a technology-rich environment. This quantitative research gathered data from principals in a large diverse school district in the Southeastern U.S. The survey questions, based on the 2009 NETS-A, addressed the following five subscales: visionary leadership, digital age culture, excellence in professional practice, systemic improvement,

and digital citizenship. Data were analyzed to identify perceptions of leader preparedness on the NETS-A. Second, the study determined the impact of the Quality-Plus Leader Academy program on leaders' perceptions of technology leadership preparation.

The research results inform leader preparation programs about areas to be included in the future. The results also help current leaders choose professional development offerings based on their own strengths and weaknesses. Improving leader preparedness will be a catalyst for supporting and implementing technology to engage today's digital natives.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

In March 2010, the draft of the National Educational Technology Plan (NETP) was published. This plan focused on transforming education through effective use of engaging technology. Successful implementation of NETP relies on strong leadership (U.S. Department of Education, 2010a). Several studies show that leadership is the best predictor of the effect of technology on teaching and learning (Anderson & Dexter, 2005; Reilly, 2005).

Meanwhile, technology is only briefly addressed in formal educational leadership programs (Dexter, 2008; Kozloski, 2006; Redish & Chan, 2007). “While other education leadership positions have long been defined and established, the executive role for technology leadership is relatively new and still only sporadically realized” (Consortium for School Networking, 2009, para 5). Key skills that encompass what technology leadership entails have not been clearly defined (Andersen & Dexter, 2005; Macaulay, 2009). “School leaders are in a unique position to inspire a vision for technology and allocate the financial and human resources to ensure complete and sustained implementation of the vision” (Redish & Chan, 2007, p. 124).

Inspiring a Vision for the Power of Technology

There is no shortage of expectations that technology will transform teaching and learning in the coming years. Educators turn to technology to fill multiple needs of schools. Data-driven decision making, electronic communication, and other administrative uses of technology have been widespread in schools for the past three

decades (U.S. Department of Education, 2010b). More recently, technology is a tool educators are turning to so they can engage students, personalize learning, and prepare students for the digital workforce (Leonard & Leonard, 2006; Prensky, 2010; Shattuck 2007). Principals must be aware of the operational and transformational changes required by the inclusion of technology (Creighton, 2003).

Leonard and Leonard (2006) posited that “public schools need to be at the forefront of technological use because it is there that the emerging generation must have the opportunities to access fully its potentialities for learning” (p. 11). Policy makers, including Georgia’s Congressman Newt Gingrich, pushed through “far-reaching legislation that reshaped the role that technology was supposed to play in education in the 21st century” (Shattuck, 2007, p. 2). There is ongoing legislative change surrounding technology, digital content, and the elimination of paper textbooks which impacts school operations (Halpim, 2011).

Shattuck (2007) further contended that “educational technologies have become a critical part of the mix of resources that will improve and extend learning” (p.23). Educators claim technology is what is necessary to engage today’s students, known as *digital natives* or *screenagers* (Black, 2011; Gosmire & Grady, 2007; Prensky, 2006; Redish & Chan, 2007). Students spend much of their time out of school accessing technology for school work, socialization, and communication. Requiring students to power down when they enter the school or classroom immediately disengages them from learning (Canuel, 2011).

Technology’s impact on instruction has grown over the last two decades. Adopting technology in the classroom has moved from adapting lessons that occasionally

highlight a technology to pervasive use of interactive and handheld devices. Today's students will benefit from the engaging nature of emerging technologies (Allen, 2011; Black, 2011; Gosmire & Grady, 2007; Prensky, 2010).

Pioneering educators, such as Allen and Black, launched initiatives to support technology-based learning that is personalized and engaging. The iSchool initiative was generated by one student who was compelled to transform learning with an iPod touch (Allen, 2011). Black (2011) chose to get out of the way and allow students to use devices they were already bringing to school as part of a Bring Your Own Technology (BYOT) initiative. These two initiatives are examples of the changing educational environment that principals must lead.

Allocating Resources for Technology

Providing emerging and innovative technologies depends greatly on funding. Technology innovations require extensive financial resources to provide an up-to-date network infrastructure, extensive professional development for teachers, and support for staff and students (Black, 2011; Halpirt, 2011). Funding innovative technology initiatives requires leaders to strategically plan for technology changes. Recurring costs associated with technology implementation and support must also be included in the planning (Consortium for School Networking, 2009; Gosmire & Grady, 2007). Changes in federal funding sources play an important role in moving forward with technology (Halpirt, 2011).

Congress sent a mixed message about the importance of technology in education when it reached a budget deal in April 2011 which included cutting the Enhancing Education Through Technology (EETT) program. The primary goal of the EETT

program was to improve student achievement through the use of technology in elementary and secondary schools. Additional goals included helping all students become technologically literate by the end of the eighth grade and establishing innovative, research-based instructional methods that can be widely implemented (U.S. Department of Education, 2010a). President Obama initially wanted to cut EETT in favor of another program that would “include a focus on integrating technology into instruction and using technology to drive improvements in teaching and learning” (Devaney, 2011, para 3) in several curriculum areas. Neither program made it through the 2011 budget cuts.

However, other federal funding sources have opened the pockets for technology spending. One of these programs is e-Rate. The e-Rate program is funded out of the U.S. DOE Office of Innovation and Improvement. The program partially funds infrastructure for network and internet access in schools. The e-Rate funding eligibility definition has expanded to include spending that closes the digital divide among students. This means broadband services for underprivileged students may now be subsidized by e-Rate funds (Canuel, 2011).

Another funding source that includes technology is Race to the Top (RT3). One of the reform areas that is a RT3 priority is a longitudinal data system that monitors student growth and success to improve instruction (U.S. DOE, 2009). In Georgia, RT3 grant winners benefitted from \$19.4 million of the \$400 million designated for innovation. Most of the innovation programs rely partially or solely on the use of technology. The RT3 innovation grant funding helped mitigate the EETT cuts by providing an additional source for technology grants (Halpirn, 2011).

A different funding dilemma occurred in New York City's Department of Education. According to Otterman (2009), the \$542 million increase in technology spending would "primarily pay for wiring and other behind the wall upgrades to city schools" (para 1). Meanwhile, 6,100 teacher positions were slated to be eliminated and the new construction budget over the next three years will be cut by \$1.3 billion. One might wonder if this was New York City's way to mitigate technology funding cuts.

The Role of the Principal

Securing and allocating necessary financial resources for technology is one of the many responsibilities of a K-12 building leader. There is widely accepted agreement among researchers, such as Creighton (2003), Marzano et al. (2005), and Stronge et al. (2011), to name a few, that "effective leadership is second only to classroom instruction among all school-related factors that contribute to what students learn at school" (Leithwood & Riehl, 2005). However, there are differences in what research says about the roles or qualities of a principal. Several frameworks have emerged to add to the body of knowledge about school leadership, namely the role of the principal.

Although now dated, Leithwood and Riehl (2005) were part of a taskforce convened by the American Educational Research Association (AERA). The AERA charged the taskforce to promote and encourage high-quality research in educational leadership. One of the papers in the research series focused on what we know about successful school leadership.

The AERA research determined that what is known about school leadership is that you are likely to find a successful leader in an excellent school and a weak leader in a poorly performing school. It is also known that educational leaders must "guide their

schools through the challenges posed by an increasingly complex environment” (Leithwood & Riehl, 2005, p. 3). Their study provided three broad categories of practice that have been identified as important for successful leaders.

The three categories are: setting direction, developing people, and developing the organization. Leithwood and Riehl (2005) further provided specific competencies and indicators for each category. They concluded that efforts to improve educational leadership should be founded on these well-documented and accepted categories.

Another dated but important study was conducted by Cotton (2003). Cotton published an extensive review of post-1985 literature that examined “principal behaviors as related to one or more student outcome measures” (p. 10). With 26 identified behaviors, Cotton’s list was much longer than Leithwood and Riehl.

The 26 behaviors were grouped into seven categories. The categories are: focus on student learning, vision and goals focused on high levels of student learning, interaction and relationships, role modeling, school culture, instruction, and accountability. Cotton’s (2003) analysis of the literature concluded with the assertion that the effects of principal leadership on student learning, while indirect, are significant and positive.

In 2005, Marzano, Waters, and McNulty published a more recent synthesis of 35 years of research on educational leadership. This meta-analysis re-iterated the assumption that “school leadership has a substantial effect on student achievement and provides guidance for experienced and aspiring administrators alike” (Marzano et al., 2005 p. 12). Marzano et al. (2005) generated a research-based list of principal responsibilities similar in length to Cotton’s behaviors.

Marzano et al. (2005) published 21 responsibilities of a school principal and their correlation with student academic achievement. The 21 responsibilities are: affirmation, change agent, contingent rewards, communication, culture, discipline, flexibility, focus, ideals/beliefs, input, intellectual stimulation, involvement in curriculum, instruction and assessment, knowledge of curriculum, monitoring/ evaluating, optimizer, order, outreach, relationships, resources, situational awareness, and visibility. Furthermore, the 21 responsibilities were subdivided to indicate those necessary for first-order and second-order change in an educational environment.

In 2011, Stronge, Richard, and Catano developed five qualities of effective principals based on existing research, applicable policy, and theoretical perspectives. The five qualities are: “building a vision, sharing leadership, leading a learning community, gathering data, and monitoring curriculum and instruction” (p. 14). This research recognized that the nature of the principal’s role has changed and there is an increasing number of responsibilities required of principals.

The qualities of a principal have been enumerated in great detail, such as published by Cotton (2003) and Marzano et al. (2005). Other prominent researchers, Leithwood and Riehl (2005) and Stronge et al. (2011), simplified the qualities into a manageable number of categories. Either way, the compilation of research generated several lists of qualities required of effective principals. The researchers’ work also validated the importance of the principal.

What is common to the research is that the principal is recognized as the single factor in effecting positive change either directly or indirectly. Researchers also agree that the role of the principal is complex in light of the ever-changing educational

environment. Managing the changes brought about by technology adds to the complexity of the principal's role.

Many studies and theorists agree that leadership is the most important factor in effective school change (Leithwood & Riehl, 2005; Stronge et al. 2008), including change brought about by technology (Dexter, 2008; Fletcher, 2009; Gosmire & Grady, 2007; Grey-Bowen, 2010; Macaulay, 2009; Redish & Chan, 2007). Specifically, the principal's role in visionary leadership, modeling best practices, and support for instructional technology is key to successful technology integration (Gosmire & Grady 2007). Kozloski (2006) advised that "educational leaders must seek to understand, promote and implement the notion that technology integration is not about the technology, it is about focusing on future generations and leading teachers to a change in pedagogy to support these generations with 21st century teaching and learning strategies that increase student achievement" (p. 176).

Dexter (2007) added that teachers look to principals to get and give input about technology uses for teaching and learning. Principals' actions determine the aspects of innovation that are implemented. Leonard and Leonard (2006) concluded that "most of the literature on leadership and technology either explicitly or implicitly places the ultimate responsibility for the use of educational technology in the purview of the principal" (p. 215).

Leader Preparation

It is widely accepted that school leadership has great influence on student outcomes (Leithwood & Riehl, 2005). Therefore, how principals are prepared for their role has never been more important. Several studies, Levine (2005) and Hess and Kelly

(2007), detailed the environment and curriculum for traditional leader preparation. These studies show that although the educational environment is quickly changing, leader preparation is not changing as fast.

Levine's (2005) study, while now dated, was a comprehensive study spanning four years of data collection. The study painted a picture of who is providing educational leader preparation and the content that is being provided. Levine evaluated educational leadership programs with several lenses, including a nine-point template for program evaluation.

Colleges of education, as noted by Levine (2005), make up over half of the nation's college and university departments. "They award one out of every 12 bachelor's diplomas, a quarter of all master's degrees, and 16 percent of all doctorates" (Levine, 2005, p. 5). Levine further identified 401 departments of education located in baccalaureate colleges primarily engaged in undergraduate education. There were 562 schools that provide primarily master's degrees, graduating close to 57% of the school administrators each year. At the doctoral level, 228 schools or departments of education produced an average of 47 school administrators and 24 doctorates a year.

There are several levels of colleges and universities which educational leaders can turn to for traditional preparation. The curriculum within the preparation programs had less variety than the educational settings. Levine (2005) noted that more than 80% of survey respondents reported taking the same nine classes as part of their leader preparation program. The nine courses were: instructional leadership (92%), school law (91%), educational psychology (91%), curriculum development (90%), research methods (89%), historical and philosophical foundations of education (88%), teaching and

learning (87%), child and adolescent development (85%), and the school principalship (84%) (Levine, 2005, p. 28). The courses found to be the least in common were: strategic management of innovation and technology (34%), negotiation (35%), and conflict resolution (41%).

Furthermore, Levine (2005) evaluated the educational leadership programs using a nine-point template. The template included:

1. Purpose: The program's purpose is explicit, focusing on the education of practicing school leaders; the goals reflect the needs of today's leaders, schools, and children; and the definition of success is tied to student learning in the schools administered by the graduates of the program.
2. Curricular coherence: The curriculum mirrors program purposes and goals. The curriculum is rigorous, coherent, and organized to teach the skills and knowledge needed by leaders at specific types of schools and at the various stages of their careers.
3. Curricular balance: The curriculum integrates the theory and practice of administration, balancing study in university classrooms and work in schools with successful practitioners.
4. Faculty composition: The faculty includes academics and practitioners, ideally the same individuals, who are expert in school leadership, up to date in their field, intellectually productive, and firmly rooted in both the academy and the schools. Taken as a whole, the faculty's size and fields of expertise are aligned with the curriculum and student enrollment.

5. Admissions: Admissions criteria are designed to recruit students with the capacity and motivation to become successful school leaders.
6. Degrees: Graduation standards are high and the degrees awarded are appropriate to the profession.
7. Research: Research carried out in the program is of high quality, driven by practice, and useful to practitioners and/or policy makers.
8. Finances: Resources are adequate to support the program.
9. Assessment: The program engages in continuing self-assessment and improvement of its performance. (Levine, 2005, p. 13)

Based on the evaluation criteria, Levine (2005) categorized a program as *model* if it met all of the nine criteria, *strong* if it met most of the criteria, and *inadequate* if it failed to meet most of the criteria. Levine noted that only a few U.S. programs were considered strong and none were considered a model. The most promising program was England's National College for School Leadership (NCLS).

More recently, Hess and Kelly (2007) conducted a systematic review of what is being taught in principal preparation programs. The pool of programs initially selected for review represent three categories: 20 elite programs, 20 highest yielding programs, and 20 randomly selected. From the initial list, core course syllabi were gathered from 56 leader preparation programs. Hess and Kelly recognized limitations of evaluating syllabi, but determined that "syllabi are like blueprints: they reveal structure and design, even if they do not fully reflect what real-life instruction looks like" (p. 5).

Hess and Kelly (2007) framed their data collection around seven themes: managing for results, managing personnel, technical knowledge, external leadership, norms and values, managing classroom instruction, and leadership and school culture.

Coding the syllabi based on weeks of study, 2,424 weeks of coursework were recorded. Over 25% of the course weeks were devoted to technical knowledge such as school funding and education law. Managing personnel comprised 15% of the course weeks with all other areas making up the remaining time.

The coding of syllabi included an evaluation of recommended readings. Hess and Kelly (2007) noted that the most common authors included Terence Deal, Kent Peterson, Allan Odden, Thomas Sergiovanni, Richard Elmore, and Michael Fullan. The study noted the absence of authors such as Paul Hill, Larry Cuban, and Jim Guthrie. Furthermore, Hess and Kelly reported that “of the 1,851 readings contained in the sample, a total of just 1.6% were authored by one of the 50 thinkers deemed most influential by management students, teachers, and practitioners” (p.34).

Both Levine (2005) and Hess and Kelly (2007) provided a picture of how leaders are prepared in traditional programs. Both point out that the curriculum has not kept up with the changing environment of schools, leaving principals unprepared for new responsibilities. One of the shortcomings pointed out by both researchers related to this study was the scant inclusion of technology leadership. Levine noted only 34% of the programs included this topic. Hess and Kelly noted that less than 5% of leader preparation instruction focused on school improvement via technology. Leonard and Leonard (2006) noted “the wide-scale integration of technology for instructional and learning purposes may continue to be problematic, and the supervisory leadership needed to address this circumstance may be deficient in many schools” (p. 213). There is collective concern about leaders’ preparation for the emerging technology-rich educational environment (Dexter, 2008; Dugger, 2007; Lebaron, 2009; Prensky, 2010).

Leonard and Leonard's (2006) study detailed several important measures of technology leadership capacity. The survey was conducted in 251 schools in northern Louisiana with results from 149 elementary, middle, and high schools. Many of the school administrators had serious concerns about their own capacity to supervise technology use in their schools. Only a slight majority (56%) believed they were adequately qualified to provide the necessary leadership for effective technology integration in their schools. Slightly more (57%) reported they were adequately familiar with various technologies that could be integrated into their school's curriculum. Eighty-seven percent indicated they needed to learn more about being effective technology leaders. The study further surmised that "educational leaders are poorly trained in the particular application of leadership to ICT [Information Communication Technologies]" (Leonard & Leonard, 2006, p. 8).

In 2011, Schrum, Galizio, and Ledesma conducted a study of the current status of administrative preparation programs. Included in the study was a scan of state certification requirements for a building level administrator. Furthermore, the study investigated how tech-savvy principals gained their skills.

Their review of the 50 states' requirements revealed that all but two states did not "explicitly require that administrators demonstrate knowledge of technology use, promotion, or integration in order to earn their licensure" (Schrum et al., 2011, p. 245). States typically followed a model allowing specific institutions to prepare candidates for certification. Upon a nation-wide review of 137 educational leadership preparation programs, 92% had no required course that mentioned technology. A few institutions offered elective courses that involved technology integration. However, based on

standard requirements, Schrum et al. (2011) noted that “only a minority of prospective leaders may have received coursework to assist them regarding the thoughtful integration of technology into instructional practice to enhance student learning” (p. 246).

With the absence of formal preparation for educational technology leadership and state requirements, Schrum et al. (2011) turned to the tech-savvy community to learn how they learned what they know about technology. School leaders reported learning about technology on their own and using technology as a teacher. Many noted that reading literature and attending conferences provided insight. Most felt it was important to model the use of technology within their building.

In describing the role of technology in their leader preparation programs, Schrum et al. (2011) noted that respondents had no specific instructional technology courses. Technology that was included in programs focused on data-driven decision making, research, and testing. Approximately 10% of the school-based administrators reported learning about the uses of technology through integrated requirements of their leader preparation program. Respondents reported that presentation, communication, administrative, and research technologies were integrated into their programs.

Today’s school leaders came into their positions through a traditional education and certification process. The triad responsible for passage to administration starts with college or university leadership programs. Once completed, a state professional standards committee grants a leadership certificate. Finally, a school district hires for a leadership position (Mitgang, 2008; Young, 2010). Unfortunately, this traditional path is not leading to the preparation of leaders for today’s schools (Creighton, 2003; Hess & Kelly, 2007; Levine, 2005; Schrum et al., 2011). Studies showed a chronic mismatch of

training and daily activities (Bush, 2008; Mitgang, 2008). Further, only 34% of university programs include coursework related to strategic management of innovation and technology (Levine, 2005).

There is a growing acceptance that leaders need on-going training where there is a bridge between learning situations and work situations (Bush, 2008; Mitgang, 2008). Due to the mismatch of traditional leader preparation and daily activities, districts are creating their own programs to fill the gap (Bush, 2008; Levin, 2005; Mitgang, 2008; Young, 2010). Bush (2008) noted that the “challenge is to find an appropriate mix of these approaches to meet the needs of leaders” (p. 126).

Supplemental Leadership Programs

Founded in 2008, the Rainwater Leadership Alliance (RLA), funded by the Rainwater Charitable Foundation, is a coalition committed to improving the quality of school leadership in public schools. RLA is dedicated to amplifying the importance of quality leadership in schools. The coalition members “lead, manage, and support high-impact principal preparation and development programs” (Cheney, 2010, p. 7).

RLA members represent school districts, universities, foundations, and non-profits. Commonalities of the RLA programs are: starting with a competency framework; reliance on strategic, proactive, and targeted recruiting strategies; highly selective programs that establish clear criteria; development with authentic opportunities to lead; providing ongoing support; and use of data to assess program effectiveness. Some of the member programs are Knowledge is Power Program (KIPP), New Leaders for New Schools, NYC Leadership Academy’s Aspiring Principal’s Program, and Quality-Plus Leader Academy (QPLA). RLA exists to share data, provide exemplars,

and promote and scale effective methods to develop and support school leaders (Cheney, 2010).

Quality-Plus Leader Academy

The Quality-Plus Leader Academy (QPLA) is one of the member organizations of the Rainwater Leadership Alliance. QPLA is an example of a district-developed supplemental leader preparation program. QPLA was developed in 2007 in response to Walt County School's need to prepare and provide principals for 35 new schools opening between 2006 and 2011 as well as any other vacancies that would naturally occur within the existing 100 schools. The goal of the academy is to "train and develop future school principals, with a curriculum created and developed by school system leaders" (Cheney, 2010, p. 131).

QPLA and the other RLA programs utilize the supportive nature of a strong cohort. QPLA selects one cohort of aspiring leaders per year. Cohorts consist of 25-30 participants who are internal to the participating district. Cohort applicants are identified and recommended by their immediate supervisor as an aspiring leader.

The QPLA selection process relies on multiple measures to get a complete picture of each candidate. Cohort applicants participate in a screening and selection process that includes: interviews, simulated in-basket items, written reflection, and oral competency. QPLA uses commercially produced leadership instruments such as Principal Insight, a Gallup Organization instrument, to identify some soft skills and adult leadership tendencies. Candidates also participate in a full-day diagnostic skills assessment process entitled "Selecting and Developing the 21st Century Leader," developed by the National

Association of Secondary School Principals (FAQs about the Quality-Plus Leader Academy, 2011, para. 8).

Likewise, in order to provide a complete training program, multiple development opportunities make up QPLA. Coursework, residency, and coaching are the three training and development components. The first phase of QPLA is a year-long series of practical sessions designed to support a principal's daily tasks and activities. Program director G. Pethel (personal communication, August 8, 2011), noted that aspiring principals experience in-depth training in the areas of human resources, budget, facilities, data management, and technology. These practical sessions are developed and conducted by system-level leaders. Because most of the QPLA participants are internal candidates, they have been in the leadership pipeline for some time and are familiar with each other and grounded in the district culture (Cheney, 2010).

Several of the sessions include the NETS-A standards. However, one of the sessions specifically targets technology leadership. The activities of the day build an awareness of technology leadership and vision. Participants learn about digital citizenship and digital-age culture with activities that explore the impact of social media, federal internet regulations, and technology-infused quality instruction. Excellence in professional practice is instilled through data integrity, total-cost of ownership, and communication strategies. In all QPLA sessions, systemic improvement is addressed (C. Wells, personal communication, August 20, 2011).

The second component of the Academy is participation in two 25-day residency experiences with successful principals. This residency experience is overseen by an experienced principal who serves as a mentor. Academy members may choose the

school level for each of the residencies. During the residency, participants follow an individual plan that includes goals, targeted areas of growth, detailed rationale, and measurable results. Participants also submit a reflective summary of each residency.

Coaching is the third component of the QPLA program. Program graduates who are in a principal position are assigned a mentor for the first two years of a principalship. The mentors provide individual support for new leaders through “one-on-one meetings, small group support sessions, and just-in-time training on essential leadership topics” (Cheney, 2010, p. 195). One of the purposes of mentoring is to establish non-evaluative partnerships between new leaders and experienced leaders who have consistently demonstrated the characteristics of QPLA leaders.

Beyond the coursework, residencies, and coaching, Academy members receive ongoing support. When Academy members graduate, they participate in ongoing professional learning activities. These include a yearly Summer Leadership Conference, monthly leadership development sessions, and periodic initiative-specific training. Sample topics and speakers for ongoing professional learning include quality-plus teaching strategies, continuous quality improvement, Dr. John Antoinetti, author of *The Engagement Cube: What’s Engaging Today’s Learners?* and Dr. Anthony Muhammad, author of *Transforming School Culture* (Cheney, 2010).

In addition to being an RLA member, QPLA has been recognized for its excellence by several other organizations. In 2011, QPLA earned recognition from the George W. Bush Leadership Institute and was added to a network of innovators around the country who are changing the way principals are developed. In the same year, QPLA

was awarded a multi-million dollar Wallace Foundation grant to fund nation-wide implementation and improvements (The Wallace Foundation, 2011).

Technology Leadership Skills

QPLA serves as a model for how school districts can develop uniquely qualified individuals to become effective leaders (Cheney, 2010; The Wallace Foundation, 2011). The inclusion of technology leadership in QPLA is another indicator of its importance for emerging leaders. Just as it is important to know that technology leadership skills are needed, it is also important to know what those skills are.

In 2005, Anderson and Dexter reported on the data from the 1998 Teaching Learning and Computing nationwide survey. This survey included more than 800 schools and examined technology leadership characteristics. From this data, Anderson and Dexter (2005) developed a Model of Technology Leadership with eight technology leadership indicators: technology committee, school technology budget, district support, principal e-mail, principal days (on technology), staff development policy, grants, and intellectual property policies.

Among the schools surveyed, 82% reported having staff development policies in place and 79% reported having a technology committee. At the low end of the scale, only 33% reported having district support for technology spending and 29% reported principal e-mail use. Anderson and Dexter (2005) noted that principals may be slower in changing their own personal technology practices than they are in implementing technology in their schools. Anderson and Dexter noted that technology brings about complex changes. Their study concluded that “although technology infrastructure is

important, for educational technology to become an integral part of a school, technology leadership is even more necessary” (Anderson & Dexter, 2005, p. 74).

Davies (2010) provided a multi-dimensional technology model (Figure 1), stating that technology leadership is “the complex interplay between the personal /biographical, the institutional /organizational, and the broader social, political and economic context” (p.58). Davies’ model uses ovals to represent those groups within the organization whose input is valuable. The external influences are shown by the outer arrows. Collectively, the internal and external entities bring expertise and questions that provide deeper understanding and reflection of change.

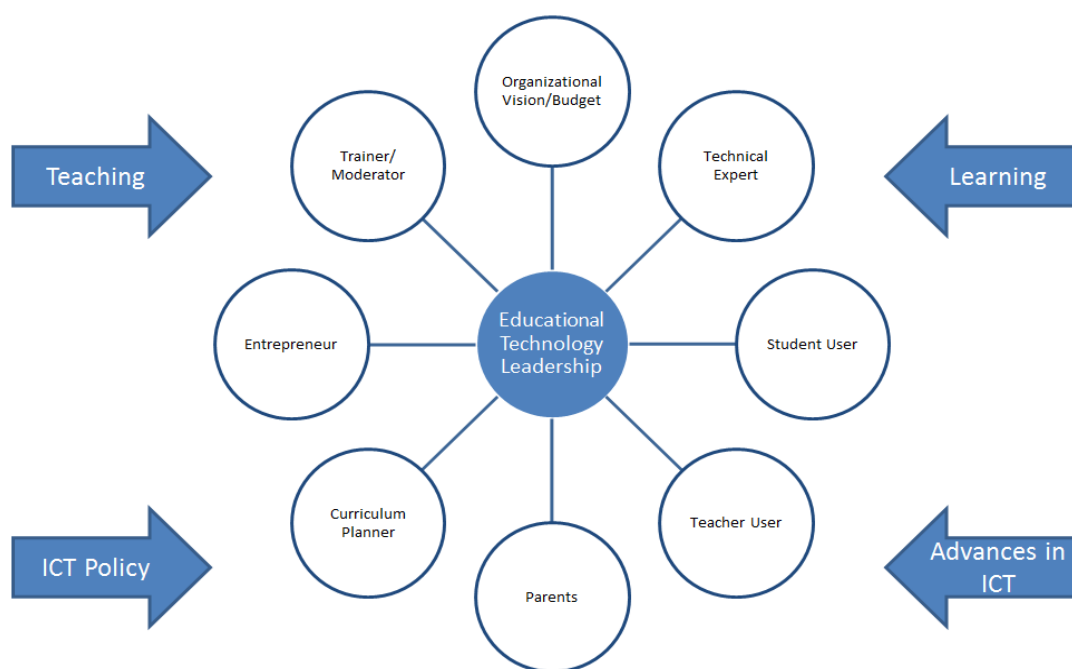


Figure 1. Educational Technology Leadership Model. Adapted from “On School Educational Technology Leadership,” by P. M. Davies, *Management in Education*, 24(2), p. 59. Copyright 2010 by SAGE publications.

Grady (2011) provided a more practical list of 10 tasks for the principal's role as technology leader. These include:

1. The principal should establish the vision and goals for technology in the school.
2. The principal should carry the technology banner in the school.
3. The principal should model use of technology.
4. The principal should support technology use in the school.
5. The principal should engage in professional development activities that focus on technology and integration of technology in student learning activities.
6. The principal should provide professional development opportunities for teachers and staff that emphasize use of technology and that facilitate integration of technology into student learning.
7. The principal should secure resources to support technology use and integration in the school.
8. The principal should be an advocate for technology use that supports student learning.
9. The principal should be knowledgeable and supportive of national technology standards and promote attainment of the standards in the school.
10. The principal should communicate the uses and importance of technology in enhancing student learning experiences to the school's stakeholders. (Grady, 2011, p. 7)

Grady (2011) made a final note on the task list to remember that "technology is nothing more than a tool used to complete work" (p. 8). This task list, as well as the

technology models by Anderson and Dexter (2005) and Davies (2010), provided guidance to principals for technology leadership skills. All three researchers support the development and use of nationally recognized technology leadership standards.

In 2001, the International Society of Technology in Education (ISTE) took on the task of developing educational technology standards. ISTE launched a project called National Educational Technology Standards (NETS) for the purpose of developing a nationally agreed upon and recognized list of standards. ISTE started with the development of technology literacy standards for students entitled, National Educational Technology Standards for Students (NETS-S), and technology standards for teachers entitled, National Educational Technology Standards for Teachers (NETS-T). These served as a national model for schools to ensure students and teachers were technology literate. Next, ISTE worked to develop technology standards for leaders, known as NETS-A (ISTE, 2009). The rationale for the NETS-A was that leaders must be able to support students and teachers and ensure that conditions essential to ensuring optimal benefits from the technology are in place” (Knezek, 2009).

ISTE’s NETS-A standards were developed by the Technology Standards for School Administrators (TSSA) collaborative. The TSSA collaborative team included representatives from national leader organizations such as American Association of School Administrators (AASA), National Association of Elementary School Principals (NAESP), National Association of Secondary School Principals (NASSP), and National School Boards Association (NSBA). The TSSA released its official consensus document for school administrators in November 2001 (Rogers, 2011; ISTE, 2009).

The consensus document was known as the National Educational Technology Standards for Administrators, NETS-A. The standards and associated performance indicators require that school administrators assume a role in technology planning and project a clear vision for integrating technology in all aspects of education (Rogers, 2011). The NETS-A represent national consensus among stakeholders of what best indicates effective technology leadership (Miller, 2008).

The 2002 ISTE NETS-A were grouped by six subscales: leadership and vision; learning and teaching; productivity and professional practice; support, management, and operations; assessment and evaluation; and social, legal, and ethical issues. For each of the six subscales, performance indicators were added to further explain the theme (ISTE, 2009).

To address the rapid changes in technology, instruction, and learning environments, ISTE recently led a collaborative, international effort to refresh the NETS for administrators. The standards refresh was influenced by “the emergence of the digital learning landscape” and “the slippage in our nation’s leadership in innovation” (Stager, 2007, p. 30). The standards update reflected the pervasive role of technology and the need to prepare students for the realities of the 21st century (Schrum et al., 2011).

Thousands of educators and education leaders participated in the project, resulting in the release of the refreshed standards beginning in 2007. Sykora (2009) detailed several questions that guided the work of the participants: “What is different about being an administrator now?” (p. 48) and “What needs to be different at this particular time in education?” (p. 48). The 2009 NETS-A reflect skills and knowledge school administrators and leaders need to lead and sustain a culture that supports digital-age

learning, builds a vision for technology infusion, and transforms the instructional landscape (Knezek, 2009).

The 2009 NETS-A reflect trends heard repeatedly in the field. Sykora (2009) noted the standards include “the need for shared leadership and a culture where the transformative leader is among the stakeholders rather than above them, the value of administrators modeling digital age professional work, and support for a culture of change and risk taking” (p. 48).

There are similarities between the 2002 and 2009 NETS-A (Figure 2). Both sets of standards include subscales related to visionary leadership and the use of technology in teaching and learning. Both standards address social, legal, and ethical use of technology. The commitment to professional development and the use of technology in professional practice are common to both standards.

What is different in the two standards is the de-emphasis of tactical use of technology including support, operations, assessment, and evaluation in the 2009 standards. Words such as *enforce*, *maintain*, and *monitor*, part of the 2002, standards are not included in the 2009 standards. Whereas, the 2009 standards include *collaboration*, *inspire*, *stakeholders*, and *strategic*. The new standards have a more strategic emphasis on systemic improvement and collaboration.

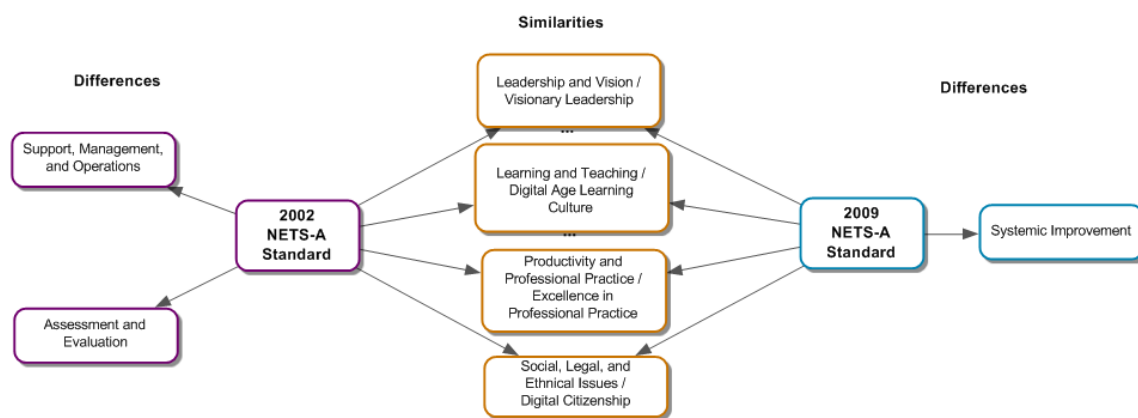


Figure 2. Comparison of 2002 NETS-A and 2009 NETS-A subscales. NETS-A subscales that are similar to both sets of standards are represented by the column in the center. Subscales that vary between the two standards are shown on either side. The subscales were taken from the ISTE 2002 NETS-A standards and the 2009 NETS-A standards (ISTE, 2009).

The revised standards have five subscales instead of the six subscales in the 2002 standards. The 2009 NETS-A subscales are: visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship. Like the 2002 standards, the 2009 NETS-A include performance indicators for each theme.

One of the 2009 NETS-A subscales is visionary leadership. This subscale guides leaders to inspire a shared vision with stakeholders to maximize positive instructional change. A visionary leader is expected to advocate technology efforts by committing time and resources to support change (ISTE, 2009).

Another NETS-A subscale is digital citizenship. This subscale calls for leaders to ensure equitable access to technology resources. Digital citizenship expects leaders to promote, model, and establish policies that ensure safe, legal, and ethical use of

technology. Responsible use of technology and social interactions in a digital environment are also expected (Knezek, 2009).

The third NETS-A subscale is systemic improvement. Systemic improvement emphasizes data-driven decision making. This subscale guides leaders to recruit and retain tech-savvy teachers and staff. Leaders should also support a technology infrastructure and partner with business for technology operations and support (Sykora, 2009).

Excellence in professional practice is the fourth NETS-A subscale. Leaders demonstrate this subscale by empowering teachers and ensuring time and resources for technology professional development. Leaders are expected to promote and model digital tools as well as remain current in technology research and trends (ISTE, 2009).

The fifth NETS-A subscale is digital age culture. This includes improving instruction through technology integration. Technology should be utilized to meet individual student needs. Leaders should model and promote effective use of technology while keeping up with local, national, and global innovations (Sykora, 2009).

Today's administrators need to have a strategic vision supported by technology to help tomorrow's students compete globally. The revised standards were "meant to inspire administrators to become 21st century leaders and provide guideposts to get there" (Sykora, 2007, p. 48). The NETS-A also provided a framework to inform leader preparation in the area of technology leadership (Knezek, 2009; Miller, 2008).

Technology Leadership Studies

Several studies have contributed to the body of knowledge surrounding technology leadership skills (Garcia, 2009; Grey-Bowen, 2011; Langlie, 2008; Macaulay,

2009; Miller, 2008; Redish & Chan, 2007). These studies relied on the 2002 ISTE NETS-A as the nationally recognized technology leadership standards. Since the NETS-A refresh was in progress during the time of the studies, each recommended further study with the refreshed standards. No studies to date have been found to include the 2009 NETS-A.

Redish and Chan (2007) studied the 2002 NETS-A with a sample of aspiring administrators. The quantitative study was conducted a quantitative with 58 students enrolled in their last semester of a Master's degree program in Educational Leadership at a large suburban university. The researchers used univariate analysis of variance to determine differences in perceptions of technology leadership preparation based on respondent demographics.

The researchers found respondents gave the "educational leadership program an overall barely average rating in preparing them as technology leaders" (Redish & Chan, 2007, p. 132). The results of the study indicated there was no significant difference in perceptions based on years of teaching experience, age, ethnicity, gender, position, or school type. Respondents also rated their preparation level on the NETS-A subscales. Redish and Chan (2007) stated there was a "wide margin of disagreement" (p. 132) about leader preparation among respondents on all subscales. Their study recommended alignment of principal preparation programs with the NETS-A.

Miller's 2008 study also used the 2002 NETS-A as the basis for her research. Miller conducted a study of 57 elementary school principals in Virginia. The study was a triangulated mixed method design in which the role of the principal as a technology

leader was explored. Miller also explored professional development needs. The study used the Educational Technology Principals Survey (ETPS) and interviews.

Miller (2008) reported that the NETS-A subscale of highest importance to principals was learning and teaching with a mean of 4.57 on a scale of 5. The lowest rated subscale was support, management, and operations. Miller noted that the school district in her study has a large district-wide technology division responsible for most of these management tasks. Therefore, principals do not concern themselves with those operational technology tasks.

Miller's (2008) study explored the differences in principal responses based on the level of technology integration in the school (high or low) and the principal's years of experience. Miller noted that the level of technology integration made a difference in leader practice and perceived value of the subscales for leadership and vision, learning and teaching, and productivity and professional practice. The mean values for these three subscales were higher in high technology integration schools and lower in low technology integration schools

Miller (2008) found no significant differences based on years of experience as a principal. All participants indicated that leadership and vision; learning and teaching; and productivity and professional practice are the subscales of greatest professional development need. Miller recommended that leader preparation programs, state education entities and school districts should help administrators develop the NETS-A skills.

A study by Langlie (2008) connected the ISTE 2002 NETS-A standards with qualities of transformation leadership to determine which "would be most valuable for

future leaders in the field” (p. 32). This was a mixed method study with 28 participants from New York State who were leaders in the field of educational technology.

Participants responded to a web-based survey with both closed and open-ended questions. Respondents were asked to indicate the value of the NETS-A items using a Likert scale.

Langlie (2008) developed a Technology Competencies Framework that “provides a lens with which graduate schools can view the qualities of leadership that should be attended to when preparing future K-12 technology leaders” (p. 99). The framework combined the operational NETS-A items with the often tested and supported qualities of transformational leadership. Langlie further recommended using the framework for higher education leader preparation and in K-12 hiring and professional development practices.

Macaulay’s research in 2009 is closely related to this study. Using the 2002 NETS-A as a framework, Macaulay determined leaders’ perceptions of their technology leadership. This quantitative study utilized the Principals Technology Leadership Assessment (PTLA) survey instrument. The PTLA was specifically written to evaluate the NETS-A standards. Each NETS-A performance indicator was re-written as an operational description for the survey. Participants were either elementary school leaders or teachers who worked in Maryland or Pennsylvania. Responses came from 48 building leaders and 29 teachers.

The study concluded that leaders perceived 28 of the 35 NETS-A standards as strengths. The seven standards not perceived as strengths were: *use of technology-based management systems to access staff/faculty personnel records; investigating how satisfied faculty and staff were with the technology support services provided by your*

district/school; assessing and evaluating existing technology-based administrative and operations systems for modification or upgrade; including the effective use of technology as a criterion for assessing the performance of faculty; implementing policies or programs meant to raise awareness of technology-related social, ethical, and legal issues for staff and students; involvement in enforcing policies related to copyright and intellectual property; disseminating information about health concerns related to technology and computer usage in classrooms and offices. Macaulay (2009) further determined there was no significant difference in technology leadership preparation based on age or years of experience. Macaulay also advised that “further research needs to be conducted on just what is an acceptable competency level on the NETS-A standards” (p. 107).

In 2009, Garcia conducted a study utilizing the Principals Technology Leadership Assessment (PTLA) survey instrument as part of a qualitative study with elementary school principals in Texas. The district was chosen based on the size and proximity to the University of Texas-Pan American (UTPA). The UTPA Leadership preparation program was evaluated to see if the program assisted in acquisition of the NETS-A skills. Garcia (2009) also explored activities outside the leader preparation program that developed the NETS-A skills.

Garcia’s (2009) study began with administration of the PTLA survey for all elementary school principals in four counties near UTPA. Responses were gathered by 30 elementary school principals, 27 of whom earned their leadership certificate through UTPA. Garcia used the mean scores on the PTLA to identify the principals with the

highest level of NETS-A skills. Those principals were interviewed to provide further insight into how they attained such a high level of technology competency.

Based on the PTLA results, Garcia (2009) made several recommendations for leader preparation. First, principals should be involved in the development, implementation, funding, and evaluation of long range technology plans. Second, the concept of total cost of ownership (TCO) should be part of evaluation and planning of technology compatibilities. Lastly, it is critical that principals are mindful of equity of access to technology as long range plans are established.

Garcia's (2009) interviews and evaluation of UTPA program artifacts provided insight into how principals acquired a high level of technology leadership skills. Garcia reported that the UTPA leader preparation program helped principals "gain skills and formulate dispositions in becoming technology leaders" (p. 201). The program fostered this by requiring the use of the internet, downloading and analyzing data, and researching best practices in educational technology. Principal interviews also provided insight into activities outside UTPA that enhanced their technology leadership skills. The principals credited technology-related workshops from their Region Educational Service Center and reading journals. None of the principals had attended a technology conference, citing that they valued such conferences but chose to send a teacher instead.

In 2011, Grey-Bowen conducted a study with elementary school principals in Miami-Dade County Schools, Florida. The study included 103 principals' responses to the ETPS survey based on the 2002 NETS-A. The purpose of the study was to "investigate the current status of technology leadership proficiencies" and "identify professional development needs" (Grey-Bowen, 2011, p. 68).

Grey-Bowen (2011) reported that principals' highest level of proficiency in the NETS-A subscale was productivity and professional practice. Two subscales tied for the lowest reported level of proficiency: assessment and evaluation; and support, maintenance, and operations.

Within each of the NETS-A subscales, indicators of the skills are further detailed. The study (Grey-Bowen, 2010) showed respondents were most proficient in the area of *employ technology for communication and collaboration among colleagues, staff, parents, students, and the larger community*, for which respondents yielded an average mean of 4.71 on a scale of 5. Respondents also indicated their second level of proficiency was *use technology to collect and analyze data, interpret results, and communicate findings to improve instructional practice and student learning* with a mean of 4.57 on a scale of 5. They reported to be least proficient in *identify, communicate, model, and enforce social, legal, and ethical practices to promote responsible use of technology* with a mean of 3.94 out of 5, and *allocate financial and human resources to ensure complete and sustained implementation of the technology plan* with a mean of 3.82 on a scale of 5. The researcher indicated that Miami-Dade Public Schools has a district level department that manages some of the operational tasks which may be the reason for low levels of proficiency in these areas.

Grey-Bowen (2010) reported that the subscale for leadership and vision was the most needed area for professional development. Furthermore, the researcher recommended that technology leadership courses in university preparation programs for school administrators must be updated and aligned to the NETS-A. At the same time, district and regional education entities must provide ongoing professional development

related to NETS-A for practicing principals. The researcher added that licensure agencies such as the Florida Department of Education must update principal leadership standards to reflect the NETS-A.

Prior research builds a case for more in-depth study of technology leadership. Specifically, it is necessary to determine how to best prepare leaders for the technology age (Ertmer et al., 2002; Macaulay, 2009). According to Garcia (2009), Langlie (2008), Macaulay (2009), and Redish and Chan (2007), there is a need to incorporate new skills in leadership programs to better prepare for today's technology-rich environment. The studies using the 2002 NETS-A all recommended further study based on the newly revised 2009 NETS-A (Garcia, 2009; Grey-Bowen, 2010; Langlie, 2008; Macaulay, 2009).

Studies based on ISTE's 2002 NETS-A examined the skills principals report as present and lacking to lead in a technology-rich environment (Grey-Bowen, 2010; Macaulay, 2009; Redish & Chan, 2007). Identifying necessary skills informs formal leadership preparation programs and local professional development on how to best prepare leaders (Langlie, 2008). The newly revised 2009 NETS-A provide an improved theoretical framework for study in the area of technology leadership preparation.

Chapter Summary

The role of the principal has changed significantly in the past two decades and includes an increasing number of responsibilities. Responding to the changes brought about by technology is one of these new responsibilities. Schools are responding to demands to provide more engaging and collaborative technologies for students and staff.

However, school leaders have not been prepared to support this technology-rich environment.

Traditional leader preparation programs do not address the skills needed to support a technology-rich environment. Supplemental leader preparation programs have been developed by educational organizations and school districts to bridge the gap between what formal education provides and what is needed for the changing role of the principal. In an effort to provide guidance in the area of technology leadership, ISTE developed educational technology standards targeting administrators called NETS-A. The research shows these nationally recognized standards should be incorporated in traditional and supplemental leadership development.

Several studies related to technology leadership skills referenced the 2002 NETS-A standards as the nationally endorsed set of skills and performance standards for technology leadership. The studies show minimal level of technology preparation for today's school leaders. These same studies recommended the use of the updated 2009 NETS-A standards for future study. There are few, if any, studies to date that have utilized the 2009 NETS-A. For this reason, the researcher incorporated the 2009 NETS-A standards as the basis of the survey instrument.

CHAPTER 3

METHODOLOGY

The purpose of this study was to explore the perceptions school leaders have of their technology leadership preparedness. The results of the study identified principals' perceptions of their technology leadership and determined the impact of the Quality-Plus Leader Academy (QPLA) on leaders' perceptions. The findings of this study contribute to the body of knowledge in the area of technology leadership. Chapter 3 discusses the research methods used to conduct the study. The first part of the chapter presents the research questions and design of the study. The next section of the chapter discusses the sample and sampling techniques used in the study. The survey instrument was described as well as the statistical analyses used to quantify the data collected in the study.

Research Questions

The research was guided by the overarching question: What is the perceived technology leadership preparedness level of Walt County administrators as measured by their understanding of the 2009 ISTE NETS-A standards? The following sub-question will add clarity:

1. How do technology leadership preparedness perceptions differ between principals who attended the Quality-Plus Leader Academy and those who did not, across the five NETS-A themes: visionary leadership, digital age culture, excellence in professional practice, systemic improvement, and digital citizenship?

Research Design

The researcher designed a quantitative study in order to determine the perceptions of K-12 principals regarding their technology leadership preparedness based on the 2009 NETS-A and the impact of QPLA on those perceptions. Because the researcher was determining perceptions rather than developing a theory, a quantitative study was required (Creswell, 2009).

This was a quasi-experimental design for several reasons. This study examined an ex post facto treatment or experiment enacted on the participants. In this case, some of the school principals in Walt County have participated in QPLA and some have not. Participation in QPLA was the experimental treatment that occurred during the preceding four years but was not within the control of the researcher. Therefore, this was a quasi-experimental study (D. Tysinger, June, 17, 2011, personal communication).

Several studies (e.g., Grey- Bowen, 2010; Langlie, 2008; Macaulay, 2009; Redish & Chan, 2007) related to technology leadership skills referenced the 2002 NETS-A standards as the nationally endorsed set of skills and performance standards for technology leadership. These same studies recommended the use of the updated 2009 NETS-A standards for future study. There are few, if any, studies to date that have utilized the 2009 NETS-A. For this reason, the researcher incorporated the 2009 NETS-A standards as the basis of the survey instrument.

Sample and Sampling

This study was conducted in a large metropolitan public school district in the Southeastern U.S. The school district comprised close to 150 schools and more than 160,000 students. There were approximately 25 high schools, 25 middle schools, 80

elementary schools, and 10 special program facilities. The student demographics were approximately 1% American Indian, 30% African American, 10% Asian American, 25% Hispanic, 5% multiracial, and 30% Caucasian. In addition to being ethnically diverse, the system was socioeconomically diverse with more than 50% of the student population qualifying for free or reduced-cost lunch.

The district was chosen based on their use of a nationally recognized leader preparation program, QPLA. QPLA supplemented leader preparation that would be provided by traditional leader preparation programs at a college or university. The researcher was granted access to the principals in Walt County Schools for the purpose of this study.

Response rate for research was calculated by the number of respondents divided by the number of eligible respondents (Fink, 2006). In this study, 135 principals from all school levels in Walt County were asked to participate. According to Krejcie and Morgan (1970), the number of respondents should be greater than or equal to 97 in order to meet the requirements for a 95% confidence interval.

Instrumentation

The Center for the Advanced Study of Technology Leadership in Education (CASTLE) developed a statistically validated assessment entitled *The Principals' Technology Leadership Assessment* (PTLA) based on ISTE's 2002 NETS-A (McLeod, 2005). The 2002 PTLA surveyed administrators' participation in several tasks involved in technology leadership. The tasks were developed from the 2000 NETS-A, a set of national standards. The standards were developed by the International Society of Technology in Education (ISTE). In 2009, ISTE updated the NETS-A standards (see

Appendix A). The overall reliability of the 2002 PTLA instrument is high, with a Chronbach's alpha (α) = .95. The 2002 PTLA also exhibited high internal reliability which was neither enhanced nor diminished by removal of individual items (McLeod, 2005).

The researcher used the 2002 PTLA as the basis for instrument development. With the permission and collaboration of the Center for Advanced Study of Technology Leadership in Education (CASTLE), the researcher developed an updated survey by replacing the 2002 NETS-A standards with the 2009 NETS-A standards (see Appendix B). Each survey item was written to operationalize the NETS-A standards (S. McLeod, July 2, 2011, personal communication). The updated PTLA survey utilized the same format by grouping questions based on the NETS-A subscales. An additional demographic question was included in the survey to support the research question based on participation in QPLA. Both surveys used the same rating scale for participant responses.

By changing the 2002 PTLA survey to reflect the updated standards, the 2002 PTLA instrument psychometrics were no longer valid. Therefore, the 2009 PTLA survey was piloted to establish content validity and improve questions (Creswell, 2009). The researcher piloted the survey with five school administrators outside the sample population. The survey was revised to improve clarity based on the pilot respondents' feedback.

Data Collection

The researcher submitted the research proposal to the Georgia Southern University (GSU) Institutional Review Board (IRB) and Walt County Schools' research board. Both review boards awarded approval for the research to be conducted.

The researcher gathered principals' email addresses from the Walt County District administrator database, which listed every building administrator in the school system. Participants were contacted via electronic mail with a request to participate in the survey. A link to the web-based survey was sent to the sample principals (see Appendix C). The researcher sent an additional request for participation seven days after the original request to increase responses.

The survey instrument was an anonymous web-based survey created and accessed through *SurveyMonkey*®. There was no identifying information captured as part of the survey; in fact, no demographic information was collected. There was no way to link data to a specific principal. Survey data was collected through the *SurveyMonkey*® password protected website and exported to Microsoft® Excel format. The data was formatted to be compatible with Statistical Package for Social Sciences (SPSS) 19.0. To generate descriptive statistics and inferential analysis, the data was imported into SPSS 19.0.

Data Analysis and Reporting

Using SPSS 19.0, the first level of data analysis was a table of descriptive statistics including frequency, mean, range, and standard deviation. The descriptive statistics were analyzed for anomalies such as empty survey responses.

The next level of analysis was a multivariate analysis of variance (MANOVA) to evaluate the effect of the independent variable across the five NETS-A subscales: visionary leadership, digital age culture, excellence in professional practice, systemic improvement, and digital citizenship. The independent variable was participation in the Quality-Plus Leader Academy. The dependent variables were the five NETS-A subscales. The results compared the perception of preparedness based on whether or not the principal participated in the leader preparation program. Further analysis using a one-way analysis of variance was performed to reveal any subscale statistical significance. Results were displayed in a table followed by descriptive text.

Chapter Summary

The purpose of this study was to explore the perceptions school principals have of their technology leadership preparedness. The researcher conducted a quasi-experimental quantitative study to identify leaders' perceptions of technology leadership preparedness and determine the impact of the Quality-Plus Leader Academy on leaders' perceptions of technology leadership preparation. Respondents were K-12 building principals in a large Southeastern U.S. school district. This district used a supplemental leader preparation program, Quality-Plus Leader Academy, to enhance traditional leader preparation. Technology leader preparation skills were defined by the 2009 NETS-A standards. The researcher used descriptive and inferential statistics to convey the results of the study.

CHAPTER 4

REPORT OF DATA AND DATA ANALYSIS

Today's students are plugged into an exciting multimedia world powered by technology. This connection creates high expectations for technology to engage today's learners and transform education to support 21st century skills. Leaders must navigate multiple complex responsibilities to ensure that technology is available and safe for student and teacher use; however, leaders must also participate in technology use preparation so they can use the 21st century technology as well as encourage its use. Many traditional leader preparation programs do not address the skills needed to support a 21st century technology environment (Mitgang, 2008; Young, 2010). However, there are supplemental leader preparation programs that offer training in the field of technology leadership (Bush, 2010).

The purpose of this study was to explore the perceptions school leaders have of their technology leadership preparedness. A multivariate analysis was conducted to determine the impact of participation in one leader preparation program, Quality-Plus Leader Academy (QPLA), on principals' perceptions of their technology leadership. Technology leadership skills were defined by the 2009 ISTE NETS-A standards and perceptions were gathered via the *Principals Technology Leadership Assessment ver. 2009* survey instrument.

This chapter presents an overview of the research questions and design. A description of the respondents is included and research results are presented in tables and narrative format. Finally, responses to the research questions are provided.

Research Questions

The study was guided by the overarching research question: What is the perceived technology leadership preparedness level of Walt County (a pseudonym) administrators as measured by their understanding of the 2009 ISTE NETS-A standards? In addition, the following sub-question added clarity:

1. How do technology leadership preparedness perceptions differ among principals who attended the Quality-Plus Leader Academy and those who did not, across the five NETS-A themes: visionary leadership, digital age culture, excellence in professional practice, systemic improvement, and digital citizenship?

Research Design

The purpose of this study was to explore the perceptions principals have of their technology leadership preparedness. The researcher conducted an anonymous quasi-experimental quantitative study to identify principals' perceptions of technology leadership preparedness and determine the impact of QPLA on principals' perceptions.

Principals from a large Southeastern U.S. school district were invited to participate via email. Principals were prompted to indicate their perception of preparedness on 21 technology leadership skills on the *Principals Technology Leadership Survey (PTLA) ver. 2009*. Each question had a 5-point scale. Descriptive and inferential statistics were used to convey the results of the study. Subscale ratios were calculated to account for variances in the number of questions for each of the five NETS-A subscales.

Respondents

In order to protect the anonymity of the district of study, a pseudonym was assigned. To ensure the anonymity of the individual principals, there was no identifying information collected on the survey. One demographic question was included to support the research questions. However, the answer to this question did not reveal any information that would identify a respondent.

An email was sent to all principals in the district of study. A link to the web-based survey was included in the email to direct participants to the data collection website. Within one week of the request, 62 principals had responded. An email reminder was sent which prompted more responses. A total of 102 responses were gathered for a 76% response rate. Q22 on the survey was the demographic question regarding program participation. Based on the data, there were 57 responses from principals who had participated in the Quality-Plus Leader Academy (QPLA). The respondents who did not participate in QPLA numbered 45. This rate is consistent with the Walt County Schools population of 54% QPLA participants.

An initial review of the survey responses indicated that 10 participants responded to all except one survey question. One respondent skipped two questions. All other survey responses were complete. All survey responses (N=102) were used when compiling descriptive statistics. However, 11 surveys were submitted with missing data. These 11 surveys had one, two, or three questions without a response. Therefore, incomplete surveys were excluded in inferential analysis resulting in 91 surveys used for calculations (n=91).

Findings

The first level of data analysis used descriptive statistics for each of the non-demographic survey questions, Q1-Q21 (Table 1). Each of these questions referenced one of the technology leadership indicators. The number of responses for each question ranged from 99 to 102. Q19, *promote, model and establish policies for safe, legal and ethical use of digital information and technology*, had the lowest response rate with 99 out of 102 participants responding. There were seven other questions where one or two respondents did not answer. The remaining 13 indicators were answered by all respondents.

Responses ranged between 2, indicating *minimally* prepared and 5, indicating *fully* prepared for all except two questions. Responses to Q4, corresponding to *ensure instructional innovation focused on continuous improvement of digital learning*, ranged from 3, indicating *somewhat* prepared, to 5. Q18, representing *ensuring access to appropriate digital tools and resources to meet the needs of all learners*, had the widest response range of 1 to 5.

Table 1

Descriptive Statistics for all Respondents

PTLA Subscales and Indicators	N	Min	Max	Mean	Std. Dev.
Visionary Leadership					
Q1- facilitate a change that maximizes learning goals using digital resources	102	2	5	3.85	.737
Q2- engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans	102	2	5	3.87	.779
Q3- promote programs and funding to support implementation of technology-infused plans	102	2	5	3.85	.883
Digital Age Learning Culture					
Q4- ensure instructional innovation focused on continuous improvement of digital learning	102	3	5	4.02	.703
Q5- model and promote the frequent and effective use of technology for learning	102	2	5	3.93	.836
Q6- to provide learning environments with technology and learning resources to meet the diverse needs of all learners	102	2	5	4.05	.813
Q7- ensure effective practice in the study of technology and its infusion across the curriculum	102	2	5	4.03	.764
Q8- promote and participate in learning communities that stimulate innovation, creativity, and digital collaboration	101	2	5	4.19	.796
Excellence in Professional Practice					
Q9- allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration	102	2	5	4.17	.732

(continued)

Table 1

Descriptive Statistics for all Respondents (continued)

PTLA Subscales and Indicators	N	Min	Max	Mean	Std. Dev.
Q11- promote and model effective communication and collaboration among stakeholders using digital-age tools	101	2	5	4.14	.813
Q12- stay up-to-date on educational research and emerging trends of effective use of technology and encourage new technologies for potential to improve student learning	100	2	5	4.05	.702
Systemic Improvement					
Q13- lead purposeful change to reach learning goals through the use of technology and media-rich resources	100	2	5	4.02	.752
Q14- collaborate to establish metrics, collect and analyze data, and share findings and results to improve staff performance and student learning	102	2	5	3.98	.796
Q15- recruit highly competent personnel who use technology to advance academic and operation goals	102	2	5	4.25	.776
Q16- establish and leverage strategic partnerships to support systemic improvement	101	2	5	3.85	.888
Q17- establish and maintain a robust infrastructure for technology to support management, operations, teaching, and learning	102	2	5	3.88	.848

(continued)

Table 1

Descriptive Statistics for all Respondents (continued)

PTLA Subscales and Indicators	N	Min	Max	Mean	Std. Dev.
Digital Citizenship					
Q18- ensure access to appropriate digital tools and resources to meet the needs of all learners	101	1	5	4.05	.876
Q19- promote, model, and establish policies for safe, legal, and ethical use of digital information and technology	99	2	5	4.38	.752
Q20- promote and model responsible social interactions related to the use of technology and information	102	2	5	4.30	.768
Q21- model and facilitate the development of a shared cultural understanding and involvement of global issues through communication and collaboration tools	102	2	5	4.01	.862

Each survey question had a possible response mean range from 1, indicating *not at all* prepared, to 5, indicating *fully* prepared, for each of the 21 indicators. The mean range was from a low score of 3.85 on a scale of 5 to a high score of 4.30 on a scale of 5 (Table 2). The lowest ranked mean was the same for Q1, Q3, Q16 ($m = 3.85$). Q1 referenced *facilitate a change that maximizes learning goals using digital resources*. Q3 referenced *promote programs and funding to support implementation of technology – infused plans*. Q16 referenced *establish and leverage strategic partnerships to support systemic improvement*. The highest ranked mean was for Q19 ($m = 4.38$) which referenced *promote, model, and establish policies for safe, legal, and ethical use of digital information and technology*. Q20 was the next highest mean ($m = 4.3$) concerning *promote and model responsible social interactions related to the use of technology and information*.

Table 2

Ranked Mean Scores of All Respondents

PTLA Indicators	<i>M</i>
Q20- promote and model responsible social interactions related to the use of technology and information	4.30
Q10- facilitate and participate in learning communities that stimulate and support faculty in the study and use of technology	4.28
Q15- recruit highly competent personnel who use technology to advance academic and operation goals	4.25
Q8- promote and participate in learning communities that stimulate innovation, creativity, and digital collaboration	4.19
Q9- allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration	4.17

(continued)

Table 2

Ranked Mean Scores of All Respondents (continued)

PTLA Indicators	<i>M</i>
Q11- promote and model effective communication and collaboration among stakeholders using digital-age tools	4.14
Q6- to provide learning environments with technology and learning resources to meet the diverse needs of all learners	4.05
Q12- stay up-to-date on educational research and emerging trends of effective use of technology and encourage new technologies for potential to improve student learning	4.05
Q18- ensure access to appropriate digital tools and resources to meet the needs of all learners	4.05
Q7- ensure effective practice in the study of technology and its infusion across the curriculum	4.03
Q4- ensure instructional innovation focused on continuous improvement of digital learning	4.02
Q13- lead purposeful change to reach learning goals through the use of technology and media-rich resources	4.02
Q21- model and facilitate the development of a shared cultural understanding and involvement of global issues through communication and collaboration tools	4.01
Q14- collaborate to establish metrics, collect and analyze data, and share findings and results to improve staff performance and student learning	3.98
Q5- model and promote the frequent and effective use of technology for learning	3.93
Q17- establish and maintain a robust infrastructure for technology to support management, operations, teaching, and learning	3.88
Q2- engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans	3.87
Q1- facilitate a change that maximizes learning goals using digital resources	3.85
Q3- promote programs and funding to support implementation of technology-infused plans	3.85
Q16- establish and leverage strategic partnerships to support systemic improvement	3.85

The next level of analysis used descriptive statistics for the five NETS-A subscales: visionary leader, digital age culture, excellence in professional practice, systemic improvement, and digital citizenship (Table 3) related to QPLA participation. Compiling the indicators for each subscale provided a better representation of the constructs of technology leadership (C. Martin, personal communication, February 15, 2012). The five subscales had unequal associated indicators which accounted for additional variation in mean scores. Therefore, subscale ratios were included for comparison (C. Thurman, personal communication, January 27, 2012).

The first subscale, visionary leadership, was determined by three indicators, Q1 through Q3. The possible range for the mean of this subscale was 3 to 15. The mean score for QPLA participants was 11.62 versus 11.61 for those who did not participate. The digital age culture subscale was comprised of Q4 through Q8 with a possible range of mean scores from 5 to 25. The mean for QPLA participants was 20.80 and 19.47 for non-participants. The third subscale, excellence in professional practice, had a mean range of 4 to 20 and was calculated using Q9 through Q12. The mean score for QPLA participants was 16.95 versus 16.1944 for non-QPLA participants. Systemic improvement, the fourth subscale, with a mean range of 5 to 25 was generated from responses to Q13 through Q17. QPLA participants reported a mean of 20.58 compared to non-participants with a mean of 19.22. The last subscale, digital citizenship, included Q18 through Q21 with a mean range of 4 to 20. The mean score for QPLA participants was 17.55 versus 15.78 for non-QPLA participants.

Table 3

Mean Scores of Perceived Technology Preparedness by QPLA Participation

Dependent Variables	QPLA	Mean	Std.	N
			Deviation	
Visionary_Leader	Participated	11.6182	1.89043	55
	Did Not Participate	11.6111	2.27128	36
Dig_Age_Culture	Participated	20.8000	3.01478	55
	Did Not Participate	19.4722	3.67607	36
Excell_Prof_Prac	Participated	16.9455	2.19780	55
	Did Not Participate	16.1944	2.47062	36
Systemic_Improvement	Participated	20.5818	2.92936	55
	Did Not Participate	19.2222	3.68868	36
Digital_Citizenship	Participated	17.5455	2.15869	55
	Did Not Participate	15.7778	3.24355	36

Prior to performing inferential analyses, preliminary assumption testing was conducted to check for normality, linearity, univariate, and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity, with no serious violations noted. A multivariate analysis of variance (MANOVA) was used to investigate the differences between QPLA participation and perceived technology leadership preparedness level across the five subscales (Table 4). For this analysis a Wilks' Lambda value of .84 was generated. A Wilks' Lambda value of 1 indicates no difference in the means; therefore, this analysis showed a difference in means. The F ratio calculated for this MANOVA was 3.33. This value indicated that the variability between groups is 3.33 times greater than the variability within the groups. The F ratio of 3.33 exceeded the statistical significance level with alpha level .05. Further analysis showed that the probability of the responses being attributed to chance is 1 in 100 ($p = .01$) or a 1% chance. Finally, the eta square value ($\eta^2 = .16$) indicated that the effect size

is large, which further indicated a difference between the QPLA and non-QPLA participants.

Table 4

Multivariate Analysis of Variance

Effect	Λ	F	df_1	df_2	p	η^2
Group	.84	3.33*	5	85	.01	.16

* $p < .05$

With statistical significance being reached, analysis of the individual subscales was performed to determine which subscales differed. An analysis of variance (ANOVA) for each subscale was performed to provide this information (Table 5). A Bonferroni adjustment generated an alpha level of .01 (.05/5). This adjustment was made to reduce Type I errors that can be generated by repeated ANOVA tests. The subscale with the least variance between QPLA and non-QPLA participants was visionary leadership with an eta square of .00. An effect size of $\eta^2 = .03$ was calculated for excellence in professional practice. Subscales, digital age culture and systemic improvement, had a .04 effect size. The largest effect size of .10 was for digital citizenship.

In addition to a large effect size for digital citizenship, the level of significance, $p = .00$ rounded from .002, was the only subscale to reach statistical significance of variance. This level indicated that there is no probable chance that the difference between groups is random. Approaching statistical significance was the subscale systemic improvement with a significance level of $p = .05$.

Table 5

Analysis of Variance

Effect	<i>MS</i>	<i>F</i>	<i>df</i> ₁	<i>df</i> ₂	<i>p</i>	<i>n</i> ²
Vision_Leader	.00	.00	1	89	.99	.00
Dig_Age_Culture	38.36	3.54	1	89	.06	.04
Excell_Prof_Prac	12.27	2.30	1	89	.13	.03
Systemic_Imp.	40.22	3.81	1	89	.05	.04
Digital_Citizen.	67.98	9.76*	1	89	.00	.10

p*<.01Response to Research Questions**

The overarching question in this study was: What is the perceived technology leadership preparedness level of Walt County (a pseudonym) administrators as measured by their understanding of the 2009 ISTE NETS-A standards? Principals were asked to indicate their perception of preparedness on 21 technology leadership skills on the *Principals Technology Leadership Survey (PTLA) ver. 2009*. Each question had a 5-point scale where 1 represented *not at all* prepared, 2 represented *minimally* prepared, 3 represented *somewhat* prepared, 4 represented *significantly* prepared, and 5 indicated *fully* prepared. Subscale ratios were calculated to account for variances in the number of questions in each subscale.

Principals indicated the highest level of preparation on the subscale digital citizenship. Out of a total possible mean score of 20, the subscale scored 16.74 (ratio = .796). The subscale ratio for excellence in professional practice was 20.83 out of 25 (ratio = .790). Digital age learning culture scored 16.03 out of 20 (ratio = .752). The

subscale ratio for system improvement was 19.98 out of 25 (ratio = .749). Finally, the subscale visionary leadership scored 11.57 out of 15 (ratio = .714).

Principals indicated they were most prepared for safe, legal and ethical use of technology (Q19, $m = 4.38$) as well as responsible social interactions related to the use of technology (Q20, $m = 4.3$). The next highest scoring indicator concerned using learning communities to stimulate and support faculty in the study and use of technology (Q10, $m = 4.28$).

The sub-question in this study was: How do technology leadership preparedness perceptions differ between principals who attended the Quality-Plus Leader Academy and those who did not, across the five NETS-A themes: visionary leadership, digital age culture, excellence in professional practice, systemic improvement, and digital citizenship?

To determine if there was a statistically significant difference between QPLA and non-QPLA participants, a multivariate analysis of variance (MANOVA) was performed. Overall, there was a statistically significant difference between QPLA participation on the combined dependent variables, $F(5, 85) = 3.33$, $p = .009$; Wilks' Lambda = .84; partial eta squared = .16. In all five subscales, QPLA participants reported a higher mean score than principals who did not participate in QPLA (Table 3).

Once it was determined that there was a statistically significant difference, further analysis was conducted to determine which of the five subscales demonstrated a significant difference. A one-way analysis of variance (ANOVA) was conducted for each of the five subscales. To reduce type 1 errors, a Bonferroni adjusted alpha level of

.01 was set for the level of significance. The only subscale to reach statistical significance was digital citizenship, $F(1, 89) = 9.76$, $p = .002$, partial eta squared = .10.

Chapter Summary

The participants in this study included 102 principals from Walt County Public Schools, a Southeastern U.S. school system. The principals perceived themselves to be the best prepared in the area of digital citizenship (subscale ratio = .796). The subscale that principals indicated they felt least prepared was visionary leadership (subscale ratio = .714). For all participants the mean scores on the 21 indicators ranged from 3.85 on a scale of 5 to 4.30 on a scale of 5. These scores reflect a high level of perceived technology leadership preparedness among those who responded to the survey.

There were 57 respondents who participated in QPLA and 45 who did not. A one-way between-groups multivariate analysis of variance was performed to investigate the differences in perceived technology leadership preparedness between QPLA and non QPLA participants. Five dependent variables were used: visionary leadership, digital age culture, excellence in professional practice, systemic improvement, and digital citizenship. The independent variable was QPLA participation. There was a statistically significant difference between QPLA participation on the combined dependent variables, $F(5, 85) = 3.33$, $p = .009$; Wilks' Lambda = .84; partial eta squared = .16. When the results for the dependent variables were considered separately, the only difference to reach statistical significance, using a Bonferroni adjusted alpha level of .01, was digital citizenship, $F(1, 89) = 9.76$, $p = .002$, partial eta squared = .10. An inspection of the mean scores indicated that principals who attended QPLA reported slightly higher

perception levels in digital citizenship ($M = 17.55$, $SD = 2.16$) than those principals who did not participate in QPLA ($M = 15.78$, $SD = 3.24$).

CHAPTER 5

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary of the Study

Today's students have grown up immersed in technology. Schools are responding to the demands to provide more engaging and collaborative technologies for students and staff (Allen, 2011; Black, 2011; Gosmire & Grady, 2007; Prensky, 2010). However, some school leaders have not been prepared to support this ever-changing technology-rich environment (Bush, 2008; Levin, 2005).

In an effort to provide guidance for ill-prepared leaders, the International Society of Technology Education developed educational technology standards, called NETS-A (ISTE, 2009) aimed at administrators. Prior research built a case for more in-depth study of technology leadership. Specifically, it was necessary to determine how to best prepare leaders for the technology age (Ertmer et al., 2002; Macaulay, 2009). Studies that used the 2002 NETS-A recommended further study based on the newly revised 2009 NETS-A (Grey-Bowen, 2010; Langlie, 2008; Macaulay, 2009; Redish & Chan, 2006) thus providing the rationale for this study.

The purpose of this study was to explore the perceptions school principals have of their technology leadership preparedness. The district of study used a supplemental leader preparation program, Quality-Plus Leader Academy, to enhance traditional leader preparation. Specifically, the researcher conducted a quasi-experimental quantitative study to identify leaders' perceptions of technology leadership preparedness and determine the impact of the Quality-Plus Leader Academy on leaders' perceptions of

technology leadership preparation. Technology leader preparation skills were defined by the 2009 NETS-A standards.

Discussion of Findings

This study referenced the 2009 ISTE NETS-A standards as the defined technology leadership skills for principals; however, due to the timing of the study, no other uses of the 2009 ISTE NETS-A standards were found. Therefore, the findings are compared to studies which used the 2002 ISTE NETS-A standards.

The findings will be compared to the body of work surrounding leader preparation. This body of work focused on the traditional curriculum and preparation of today's leaders. Additional literature was included to explore supplemental leader preparation. These findings specifically convey the impact of a supplemental leader preparation program.

Technology Leadership Preparedness

The overarching research question that guided this study was: What is the perceived technology leadership preparedness level of Walt County (a pseudonym) administrators as measured by their understanding of the 2009 ISTE NETS-A standards? The 2009 ISTE NETS-A comprised five technology leadership subscales with several indicators for each subscale. The subscales are: visionary leadership, digital age culture, systemic improvement, excellence in professional practice, and digital citizenship. This study revealed principals' perceptions of technology leadership preparedness in the following order based on the subscale mean ratio: digital citizenship (.837), excellence in professional practice (.833), digital age learning culture (.801), systemic improvement (.799), and visionary leadership (.771).

Principals reported their highest level of technology leadership preparedness as digital citizenship ($F(1, 89) = 9.76, p = .002, \text{partial eta squared} = .10$). This subscale called for leaders to ensure equitable access to technology resources. Digital citizenship expected leaders to promote, model, and establish policies that ensured safe, legal, and ethical use of technology. Responsible use of technology and social interactions in a digital environment were also expected.

This finding was consistent with the results of a study by Hess and Kelly (2007) that disclosed leader preparation programs had the highest prevalence of curriculum related to policies, management, and school law. Anderson and Dexter (2005) also reported that 82% of schools had technology and staff development policies in place. The high level of technology leadership preparedness was also found to be in the top half of the subscale scores in a study by Redish and Chan (2007).

Conversely, other studies found skills common to digital citizenship were lacking among administrators. Macaulay (2009) and Grey-Bowen (2010) reported that the social, legal, and ethical issues indicator was the lowest NETS-A subscale score. Garcia (2009) reported that total cost of ownership (TCO) and equity of access were the lowest scored areas for principals which contradicted the findings of this study.

Visionary leadership was identified as the NETS-A subscale with the lowest perceived preparation level by the respondents ($F(1, 89) = .00, p = .99, \text{partial eta squared} = .00$). This subscale guides leaders to inspire a shared vision with stakeholders to maximize positive instructional change. A visionary leader is expected to advocate technology efforts by committing time and resources to support change.

Studies by Levine (2005), Hess and Kelly (2007), and Leonard and Leonard (2006) indicated that technology leadership preparation was lacking in traditional leader preparation programs. Garcia (2009) recommended more involvement in long-term technology planning for principals, and Stager (2007) indicated there was a “slippage of our nation’s leadership in innovation causing the refresh of the NETS-A” (p. 30).

Additional research supported the finding of visionary leadership as the lowest score. Studies using the 2002 NETS-A showed the subscale for leadership and vision as the greatest professional development need (Grey-Bowen, 2010; Miller, 2008). Redish and Chan’s (2007) study of a supplemental leadership program showed that leadership and vision ranked fourth out of the six 2002 NETS-A standards.

Quality-Plus Leader Academy Impact

The sub-question for this study was as follows: How do technology leadership preparedness perceptions differ among principals who attended the Quality-Plus Leader Academy (QPLA) and those who did not, across the five NETS-A themes: visionary leadership, digital age culture, excellence in professional practice, systemic improvement, and digital citizenship? The findings of this study indicated there was a statistically significant difference between technology leadership preparedness perceptions of QPLA participants and non-QPLA participants ($F(5, 85) = 3.33, p = .009$; Wilks’ Lambda = .84; partial eta squared = .16). Further review indicated that for all five subscales, QPLA participants had a higher mean score than non-QPLA participants. Therefore, QPLA participants’ perceptions were higher than non-QPLA participants on the five NETS-A subscales.

There is a wealth of research indicating that traditional leadership preparation alone is insufficient for today's schools (Hess & Kelly, 2007; Leonard, 2006; Levine, 2005; Mitgang, 2008; Young, 2010). Specifically, there is collective concern about leaders' preparation for the emerging technology-rich educational environment (Dexter, 2008; Dugger, 2007; Lebaron, 2009; Prensky, 2010). Schrum et al. (2011) reported that 92% of leader preparation courses had no mention of technology.

Principals who had high levels of technology leadership skills credited technology-related workshops for their knowledge (Garcia, 2009). Furthermore, Grey-Bowen (2010) recommended that district and regional educational entities should supplement traditional programs with ongoing professional development related to NETS-A.

Conclusions

Evidence from this study suggests that K-12 principals have the highest perceptions of technology leadership preparedness for the 2009 NETS-A subscale digital citizenship. Because the role of the principal is complex and multi-faceted, it is easy to see how a principal can be consumed with daily management tasks. A principal's immediate attention as it relates to technology could be drawn to those components that relate to appropriate technology use and ensuring equity of access.

Principals in this study who were participants in a supplemental leadership preparedness program, QPLA, had higher perceptions of technology leadership preparedness compared to principals who had not participated in QPLA. There is an abundance of literature providing evidence that traditional leadership programs are

insufficient for today's schools. Principals with high technology leadership skill levels participated in technology-related workshops and supplemental programs.

Implications for Administrators

Changing the foundational and on-going leadership development to include technology leadership is imperative. The ISTE 2009 NETS-A provide a framework for developing technology leadership skills. Traditional leader preparation programs, regional education centers, and school districts should include the NETS-A standards in leadership development activities.

The findings in this study further solidify the vast body of research indicating that principals are not adequately prepared for leadership in a technology-rich environment. Principals must leverage resources beyond formal leadership preparation to develop technology leadership skills. There is evidence that principals perceive themselves to be better prepared in the area of digital citizenship than the other four NETS-A subscales. However, there is a wide gap to be closed with the remaining NETS-A subscales: visionary leadership, systemic improvement, digital age culture, and excellence in professional practice.

Recommendations

Implementing the Results of the Study

The findings of this study indicated principals' technology leadership skills have room for improvement. Recommendations for implementing the results of this study include the following:

1. School districts should consider using supplemental principal preparation programs to further prepare their building leaders. It is recommended that

districts either choose or develop a supplemental program that incorporates the NETS-A standards as part of the curriculum. Technology leadership skills need not be taught in isolation but could be embedded in standard dimensions of leader development.

2. It is recommended that school districts utilize the 2009 NETS-A to provide professional growth opportunities for principals. Districts should look for every opportunity to build visionary technology leadership skills within principals. Following visionary leadership as the highest priority, the remaining NETS-A subscales should be included in professional learning offerings.

Further Research

Based on the findings of this study, recommendations for further research into this field include:

1. Further study of the NETS-A subscale, digital citizenship, would provide better understanding of the divergent study results.
2. Further study of other supplemental leadership preparation programs is also suggested.
3. While the NETS-A is a nationally developed and recognized set of technology leadership skills, it would be valuable to know which of those leadership skills impact student achievement.
4. The district of study had a large district-level technology department that provided technology leadership and took on some of the responsibilities

referenced in the NETS-A. If this study were replicated, it is recommended that principals in smaller districts be surveyed.

5. It would be interesting to determine with whom the primary responsibility for the NETS-A standards should reside: principal, district leadership, or other school personnel.
6. Further study by school level could provide insight about how technology leadership differs among elementary, middle, and high schools.
7. A study that looked at teachers' perceptions of their supervising leaders' technology leadership preparedness would be insightful.
8. A qualitative study focused on the causes of higher perceived technology leadership preparedness would yield helpful information to inform professional learning.

Dissemination

The findings from this study will be disseminated in a number of ways. This dissertation will be published into a hardbound book, and a copy of it will be placed at the Zach S. Henderson Library on the campus of Georgia Southern University as well as in the Department of Leadership, Technology, and Human Development on that same campus. An electronic version has also been made available on the Internet.

The researcher will provide the results to the district of study as required by the district research review board. In addition, the results will be reviewed with the QPLA organizers for consideration of program changes. Finally, the researcher has made plans to present the results of this research at appropriate scholarly conferences and in appropriate publications.

REFERENCES

- Allen, T. (2011, April 26). *iSchool initiative*. Speech presented at BYOT Symposium, Kennesaw State University, Kennesaw.
- Anderson, R. E., & Dexter, S. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly, 41*(1), 49-82.
- Bass, B. M., & Avolio, B. J. (1994). *Improving organizational effectiveness through transformational leadership*. Thousand Oaks, CA: Sage.
- Black, T. (2011, April 26). *Bring your own technology*. Speech presented at BYOT Symposium, Kennesaw State University, Kennesaw.
- Bush, T. (2008). *Leadership and management development in education*. London: Sage.
- Canuel, J. (2011, April 11). *21st century students and 21st century challenges*. Speech presented at Blackboard Executive Symposium, NBC Studios, New York.
- Cheney, G. R. (2010). *A new approach to principal preparation: Innovative programs share their practices and lessons learned*. Fort Worth, TX: Rainwater Leadership Alliance.
- Consortium for School Networking (CoSN). (2009). *Framework of essential skills of the K-12 CTO* (V. 2.0). Retrieved from <http://www.CoSN.org/framework/>
- Cotton, K. (2003). *Principals and student achievement: What the research says*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Creighton, T. B. (2003). *The principal as technology leader*. Thousand Oaks, CA: Corwin Press.

- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed method approaches*. Thousand Oaks, CA: Sage Publications.
- Davies, P. M. (2010). On school educational technology leadership. *Management in Education, 24*(2), 55-61. doi: 10.1177/0892020610363089
- Dexter, S. (2008). Leadership for IT in schools. *International handbook of information technology in primary and secondary education, 20*, 541-554. New York: Springer. doi: 10.1007/978-0-387-73315-9
- Devaney, L. (2011). FY11 budget details: A mixed bag for education. *eSchool News*. Retrieved from <http://www.eschoolnews.com/2011/04/12/fy11-budget-eliminates-educational-technology-funds/>
- Dugger, W., Jr. (2007). The status of technology education in the United States. *Technology Teacher, 67*(1), 14-21.
- Ertmer, P. A., Bai, H., Dong, C., Khalil, M., Park, S. H., & Wang, L. (2002). *Online professional development: Building administrators' capacity for technology leadership*. Eugene, OR: National Education Computing Conference. (ERIC Document Reproduction Service No. ED475930).
- FAQs about Quality-Plus Leader Academy. (2011). Retrieved from <http://www.jcmagill.org/gcps-mainweb01.nsf/pages/FAQsAbouttheQuality-PlusLeaderAcademy>
- Fink, A. (2006). *How to conduct surveys: A step-by-step guide*. Thousand Oaks, CA: Sage Publications.
- Fletcher, G. H. (2009, May). A matter of principals. *THE Journal: Technological Horizons in Education -- THE Journal*. Retrieved from

http://thejournal.com/Articles/2009/05/01/A-Matter-of-Principals.aspx?sc_lang=en

Garcia, A. (2009). *The development of the elementary principal as a technology leader* (Doctoral dissertation, University of Texas-Pan American). ProQuest.

Gosmire, D., & Grady, M. L. (2007). A bumpy road: Principal as technology leader. *Principal Leadership*, 7(6), 16-21.

Grady, M. L. (2011). *Leading the technology-powered school*. Thousand Oaks, CA: Corwin Press.

Grey-Bowen, J. E. (2010). *A study of technology leadership among elementary public school principals in Miami-Dade county* (Unpublished doctoral dissertation). St. Thomas University. Retrieved from <http://gradworks.umi.com/34/27/3427096.html>

Halpirn, J. (2011, April 28). *Connecting the dots*. Speech presented at Center for Digital Education, Atlanta.

Hess, F. M., & Kelly, A. P. (2007). Learning to lead: What gets taught in principal preparation programs. *Teachers College Record*, 109(1), 244-274.

International Society of Technical Educators. (2009). *International Society of Technical Educators National Educational Technology Standards for Administrators*. Retrieved from http://cnets.iste.org/administrators/a_stands.html

Kozloski, K. C. (2006). *Principal leadership for technology integration* (Unpublished doctoral dissertation). Drexel University, Pennsylvania. Retrieved from <http://dspace.library.drexel.edu/handle/1860/886>

- Knezek, D. (2009, March 1). *Updating tech standards for administrators* [Web log interview]. Retrieved from <http://www.youtube.com/watch?v=82AtD9frGnM>
- Krejcie, V., & Morgan, D. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*(608).
- Langlie, N. (2008). *Educational technology leaders: Competencies for a conceptual age*. (Doctoral dissertation). Retrieved from http://www.iste.org/Content/NavigationMenu/Research/NECC_Research_Paper_Archives/NECC2009/
- LeBaron, J. (2009). *Research report for GeSCI meta-review of ICT in education*. Cullowhee, NC: Global e-School and Communities Initiative, GeSCI.
- Leithwood, K. A., & Riehl, C. (2005). *What we know about successful school leadership*. Philadelphia, PA: Laboratory for Student Success, Temple University.
- Leonard, L., & Leonard, P. (2006). Leadership for technology integration: Computing the reality. *Alberta Journal of Educational Research, 52*(4). Retrieved from <http://ajer.synergiesprairies.ca/ajer/index.php/ajer/article/view/576/561>
- Levine, A. (2005). *Educating school leaders* (Publication). The Education Schools Project.
- Macaulay, L. S. (2009). *Elementary principals as technology instructional leaders*. (Doctoral dissertation). Retrieved from http://www.iste.org/Content/NavigationMenu/Research/NECC_Research_Paper_Archives/NECC2009/
- Marzano, R. J., Waters, T., & McNulty, B. A. (2005). *School leadership that works: From research to results*. Alexandria, VA: Association for Supervision and Curriculum Development.

- McLeod, S. (2005). *Principals technology leadership assessment* [Survey instrument and directions]. Center for the Advanced Study of Technology Leadership in Education. Retrieved from <http://schooltechleadership.org/research/projects/ptla/>
- Miller, M. L. (2008). *A mixed-methods study to identify aspects of technology leadership in elementary schools* (Doctoral dissertation, Regent University). ProQuest.
- Mitgang, L. D. (2008). Becoming a leader: Preparing school principals for today's schools. *Perspective*, 1-11.
- Otterman, S. (2011, March 29). In city schools, tech spending to rise despite cuts. *The New York Times*, p. A1.
- Perkins, R. (2011). Using research-based practices to increase response rates of web-based surveys. *Educause Quarterly*. Retrieved from <http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/UsingResearchBasedPracticestoI/230534>
- Prensky, M. (2006). *"Don't bother me Mom, I'm learning!": How computer and video games are preparing your kids for twenty-first century success and how you can help!* St. Paul, MN: Paragon House.
- Prensky, M. (2010). *Teaching digital natives: Partnering for real learning*. Thousand Oaks, CA: Corwin.
- Redish, T., & Chan, T. C. (2007). Technology leadership: Aspiring administrators' perception of their leadership preparation program. *Electronic Journal of Integration of Technology in Education*, 6, 123-139.
- Reilly, P. (2005). Leadership: Walking the talk. *Technology & Learning*, 20-26.
- Rogers, K. M. (2011). *The internet and the law*. Basingstoke, UK: Palgrave Macmillan.
- Schrum, L., Galizio, L. M., & Ledesma, P. (2011). Educational leadership and technology integration: An investigation into preparation, experiences, and roles. *Journal of School Leadership*, 21(2), 241-261.

- Shattuck, G. (2007). *The historical development of instructional technology integration in K-12 education*. Retrieved from the University of Georgia website:
http://www.nowhereroad.com/technology_integration/readings/shattuck.pdf
- Stager, G. (2007, June). Refreshing the ISTE technology standards. *District Administration*, 30-36.
- Stronge, J. H., Richard, H. B., & Catano, N. (2008). *Qualities of effective principals*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Sykora, C. (2009, March/April). Building ed tech leadership. *Learning & Leading with Technology*, 48.
- The Wallace Foundation. (2011). *The Wallace Foundation launches major "principal pipeline" initiative to help school districts build corps of effective school leaders* [Press release]. Retrieved from <http://www.wallacefoundation.org/view-latest-news/PressRelease/Pages/The-Wallace-Foundation-Launches-Major-Principal-Pipeline-Initiative-to-Help-School-Districts-Build-Corps.aspx>
- United States Department of Education. (2009). *Race to the top: Executive summary*. Retrieved from <http://www2.ed.gov/programs/racetothetop/index.html>
- United States Department of Education. (2010a). *U.S. Department of Education*. Retrieved from <http://www.ed.gov/technology/netp-2010>
- United States Department of Education, Department of Educational Technology. (2010b). *Transforming American education: Learning powered by technology*. Retrieved from <http://www2.ed.gov/about/offices/list/os/technology/netp.pdf>
- Young, M. D. (2010). From the director: Why not use research to inform leadership certification and program approval? *UCEA Review*, 51(2), 1-3.

APPENDICES

APPENDIX A

2009 ISTE NETS-A**1. 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. Educational Administrators:

- a. inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders.
- b. engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision.
- c. advocate on local, state and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan.

2. 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. Educational Administrators:

- a. ensure instructional innovation focused on continuous improvement of digital-age learning.
- b. model and promote the frequent and effective use of technology for learning.
- c. provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners.
- d. ensure effective practice in the study of technology and its infusion across the curriculum.
- e. promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital-age collaboration.

3. 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. Educational Administrators:

- a. allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration.

APPENDIX A (continued)

- b. facilitate and participate in learning communities that stimulate, nurture and support administrators, faculty, and staff in the study and use of technology.
- c. promote and model effective communication and collaboration among stakeholders using digital-age tools.
- d. 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.

4. Systemic Improvement

Educational Administrators provide digital-age leadership and management to continuously improve the organization through the effective use of information and technology resources. Educational Administrators:

- a. lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources.
- b. collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning.
- c. recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals.
- d. establish and leverage strategic partnerships to support systemic improvement.
- e. establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching, and learning.

5. Digital Citizenship

Educational Administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture. Educational Administrators:

- a. ensure equitable access to appropriate digital tools and resources to meet the needs of all learners.
- b. promote, model and establish policies for safe, legal, and ethical use of digital information and technology.
- c. promote and model responsible social interactions related to the use of technology and information.

APPENDIX A (continued)

- d. model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools.

APPENDIX B

Permission to Modify Survey**Re: Permission to modify PTLA survey****Nash, John [EL PS]** to: Wendy_Metcalf

History: This message has been replied to.

Hi Wendy,

Absolutely, there's no problem. And because we will be in close contact as you do your work, the permission is almost unnecessary.

All the best,
-->john

John B. Nash, PhD, Associate Professor | Associate Director, CASTLE
Iowa State University | Educational Leadership | Human Computer
Interaction

e: jnash@iastate.edu
w: <http://ReformByDesign.posterous.com>
t: @jnash
w: +1.515.294.0552
m: +1.650.799.6703

On 6/27/11 1:55 PM,
<Wendy_Metcalf

>
>Hello Dr. Nash,
>Thank you for taking time to speak with me last week. Would you please
>reply with written permission to modify the current PTLA survey? With
>your
>permission, I will modify the PTLA survey items based on the updated 2009
>International Society of Technology in Education National Educational
>Technology Standards for Administrators. I will use the modified survey
>as
>part of my research study.
>
>
>Kind regards,
>Wendy Metcalf

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 Georgia Southern University. Assessment items are based on the 2009 International Society for Technology in Education's (ISTE) National Educational Technology Standards for Administrators (NETS-A).

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. Answer as many of the questions as possible. If a specific question is not applicable, leave it blank. For example, if a question asks about technology planning activities in your district, and your district has not engaged in any such activities, leave the item blank.

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.***

I. Visionary Leadership

1. 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

2. 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

3. 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

APPENDIX C (continued)

II. Digital Age Learning Culture

4. 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

5. To what extent are you prepared to model and promote the frequent and effective use of technology for learning?

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

6. 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

7. 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

8. 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

9. 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

10. 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

APPENDIX C (continued)

11. 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

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

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

IV. Systemic Improvement

13. 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

14. 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

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

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

16. 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

APPENDIX C (continued)

17. 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

18. 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

19. 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

20. 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

21. 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

22. Please indicate if you have completed or are currently participating in the Quality-Plus Leader Academy (QPLA).

- Yes, I have participated in QPLA
 No, I have not participated in QPLA

Survey adapted from the 2002 Principals Technology Leadership Survey (PTLA) with permission from the Center for Advanced Study of Technology Leadership (CASTLE) (see Appendix B).

APPENDIX D

Georgia Southern University IRB Approval

Georgia Southern University Office of Research Services & Sponsored Programs		
Institutional Review Board (IRB)		
Phone: 912-478-0843		Veazey Hall 2021
Fax: 912-478-0719	IRB@GeorgiaSouthern.edu	P.O. Box 8005 Statesboro, GA 30460

To: Wendy Metcalf
Dr. Teri Melton

cc: Charles E. Patterson
Vice President for Research and Dean of the Graduate College

From: Office of Research Services and Sponsored Programs
Administrative Support Office for Research Oversight Committees
(IACUC/IBC/IRB)

Date: 01/24/12

Initial Approval Date: 01/23/12

Expiration Date: 12/30/12

Subject: Status of Application for Approval to Utilize Human Subjects in Research

After a review of your proposed research project numbered **H12228** and titled "**K-12 Principals' Perceptions of Their Technology Leader Preparedness.**" it appears that your research involves activities that do not require full approval by the Institutional Review Board according to federal guidelines.

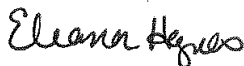
According to the Code of Federal Regulations Title 45 Part 46, your research protocol is determined to be exempt from full review under the following exemption category(s):

- B2 Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (I) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (II) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that your research is exempt from IRB approval. You may proceed with the proposed research.

Please notify the IRB when you have completed the project by emailing irb@georgiasouthern.edu. Include the date of completion, the number of subjects (records) utilized and if there were any unexpected events related to the subjects during the project. (If none, state no unexpected or adverse events occurred during the conduct of the research.)

Sincerely,



Eleanor Haynes
Compliance Officer