This quantitative, non-experimental study examined the relationship between Illinois public school principal’s self-efficacy and technology behaviors. The Principal Sense of Efficacy Scale (PSES; Tschannen-Moran & Gareis, 2004) was used to measure self-efficacy, while the Principal Technology Leadership Assessment (PTLA; CASTLE, 2009) was used to measure principal technology behaviors. Demographic variables such as principal experience, education employment in any role, and gender were also considered. Of the population of 3400 public school principals statewide, 328 voluntarily participated in this study.

This study found a positive, significant relationship between principal self-efficacy and technology. Such relationships were significant for both males and females. Additionally, when looked at together with self-efficacy, total years employed as public school principals had a negative relationship with self-efficacy; total years in education, however, yielded a positive relationship. Exploratory analyses examined subscales of both instruments. The results inform the identification and development of principal candidates for their ever-changing, complex role in leading Future Ready schools. Results also provide opportunities for future research related to school leader self-efficacy and technology.
EXAMINING PRINCIPAL SELF-EFFICACY AND TECHNOLOGY BEHAVIORS

BY

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Earning a doctoral degree requires a sustained effort over time, self-discipline, and a humble disposition, knowing that all of these qualities contribute to meaningful learning. Such learning also requires the support and guidance of many people through the gifts of time, expertise, resources, support and patience.

I would like to thank my husband, Jim Melton, for his tireless dedication to our family; Brent Anderson, with whom I walked this journey of coursework and writing; my dissertation committee—Dr. Jon Crawford, Dr. Lisa Davidson Becker, and Dr. Stephen Tonks—for believing in me and asking hard questions that have made me better; Dr. Kelly Summers for always making time to offer support; and my extended family, friends and professional colleagues.
DEDICATION

To my husband and children, Jim, Mark, Tessa, Alexa, and Liana Melton

and in memory of my parents, Rob and Mary Reid – Colossians 3:23.
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CHAPTER 1
INTRODUCTION

Twenty-first century public schools are entrenched in accountability and change, posing ongoing challenges and increased expectations for school leaders. Future-ready leaders must assert a collaborative, connected lens and a compelling interest in navigating change (Mullen, 2011). Much of this aligns with technology integration that allows for learning within and beyond the physical walls of schools. From extensive research on pedagogy, technology and change to the expectations set forth in the United States Department of Education Office of Educational Technology’s National Education Technology Plan (NETP) and Future Ready Schools initiative, it is evident school leaders have much to learn about technology and how to support technology understanding and best practices in the schools (Afshari, Baker, Luan, Smah, & Fooi, 2009; Anderson & Dexter, 2005; Banoglu, 2011; Bass & Avolio, 1994; Fullan, 2013; Future Ready Schools, 2014; Garland, 2009; Gosmire & Grady, 2007; Hadjithoma-Garstka, 2011; Lashway, 2003; Lecklider, Clausen, & Britten, 2009; Leithwood & Duke, 1999; Leithwood & Riehl, 2003; Leonard & Leonard, 2006; Miranda & Russell, 2011; NETP, 2010; Papaioannou & Charalambous, 2011).

Fullan (2013) explored the Stratosphere where pedagogy, technology, and change come together. In doing so, he asserted the pace of technology change is significantly faster than pedagogy. Fullan commanded school leaders to become intentional in using technology change. In support of this command, Fullan cited four criteria necessary for this union to be meaningful.
It must be “i) irresistibly engaging [for students and for teachers]; ii) elegantly efficient and easy to use; iii) technologically ubiquitous 24/7; and iv) steeped in real life problem solving” (p. 4). Likewise, Fullan supported the idea of viewing oneself as a learner to impact schools moving forward. He notes, “Only those who know how to learn, who can relate to others and the environment (including ‘things’), and who make the world part of their own evolving being will thrive in this world” (p. 3).

Pedagogy, the practice of teaching, is changing as we learn more about how students learn best and how technology has the power to support these changes. Technology integration for its own sake is not enough. Levin and Fullan (2008) identified elements critical to systems renewal or change. These elements include building capacity through a small number of ambitious, achievable goals and engagement with strong leadership.

Strong leadership is also a critical element in the United States Department of Education’s Office of Educational Technology’s NETP (2014) and Future Ready Schools initiative. The stated goal of this initiative was to “create a vision for the strategic application of technology throughout the education system in support of student learning and achievement and consistent with the administration’s broader education and economic priorities.” The progression toward the plan included department level conversations and outreach events to seek multiple perspectives from educators, industry and other citizen groups and to ensure transparency. The most recent version was posted on March 5, 2010 and evolved into *Transforming American Education* (2010). There are two the assumptions identified in the plan that explicitly address leadership. The first assumption identifies effective teaching as a precursor to learning. With that, it presumes that creating teams of educators representing various roles should be a priority and that technology gives us the ability to collaborate with those beyond our physical proximity.
The second assumption is that solid preparation and ongoing training is critical for teachers and leaders in schools to promote effective student learning.

In June 2013, President Obama announced the ConnectEd initiative. This initiative is a commitment to connect 99% of students to broadband in a five-year time period and to empower both students and teachers by increasing access to devices and digital media. The Future Ready Schools initiative developed from ConnectEd in November 2014, extending a Future Ready Schools pledge and bringing together 100 school superintendents for a summit, ConnectEd to the Future, in Washington, D.C. Next steps include regional summits and access to an online community. Richard Culatta (2014), Director of the Office of Educational Technology, wrote that “for these resources to leverage their maximum impact on student learning, schools and districts must develop the human capacity, digital materials, and device access to use the new bandwidth wisely and effectively”. Technology leadership, one of many roles the effective 21st Century school leader must fulfill, is a role that has gained footing at the federal level of the education system. It is part of the future for district and school leaders. As Kelly (2010) stated in *What Technology Wants*, “When we spy our technological fate in the distance, we should not reel back in horror of its inevitability; we should lurch forward in preparation” (p. 173). Kelly’s study examined the relationship between technology and the construct of self-efficacy leaders need to persist in times of challenge and complexity (Wood & Bandura, 1989).

### Theoretical Construct

This study was rooted in self-efficacy, one of the key tenets of Bandura’s (1977) study of social cognitive theory. Self-efficacy is defined as “people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their
lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave” (Bandura, 1994, p. 71). Considering self-efficacy and leadership, Bandura (1993) referenced the increased success of leaders who believe they can influence the environment within which they work and positively shape their own skills. Further, individuals with high levels of self-efficacy showed increased abilities to persevere through complex tasks (Bandura, 1982; Covington; 1984).

Problem Statement

To date, minimal consideration has been given to the relationship among leadership, self-efficacy and technology behaviors, particularly in the public school arena. Given the many challenges school principals face, the rapid pace of technology, and the attention toward schools and technology at the federal level, further research needs to be conducted to see if there is a link between leader self-efficacy and technology behaviors in order to identify and support effective leadership in our schools.

Purpose

The purpose of this quantitative study was to broaden the scholarly research base related to principal self-efficacy and principal technology behaviors. Principal self-efficacy, as measured by the Principal Sense of Efficacy Scale (PSES; Tschannen-Moran & Gareis, 2004) was one independent variable in this study; years of experience in education and as a principal were also independent variables. Principals’ self-reported technology behavior, as measured by the Principal Technology Leadership Assessment (PTLA; CASTLE, 2009), was the dependent variable. With that, the relationship between principal self-efficacy and principal-reported
technology behaviors was examined.

Significance of Study

This study is significant because of the limited practical research that includes leader self-efficacy and leader technology behaviors. Studies regarding school principals and technology emerged (Afshari, Baker, Luan, Smah, & Fooi, 2009; Garland, 2009; Gosmire & Grady, 2007; Hadjithoma-Garstka, 2011; Lecklider, Clausen, & Britten, 2009; Miranda & Russell, 2011). Likewise, studies have been conducted that explored leadership and self-efficacy (Leithwood & Jantzi, 2008; Lyons & Murphy, 1994; Osterman & Sullivan, 1994; Tschannen-Moran & Gareis, 2004). Very few studies, however, have looked at both variables in tandem (Kiriakidis, 2012). Doing so was critical given the emphasis on technology in schools and on a global scale. For example, the Office of Educational Technology (2010) noted that educating young people to use technology in a fluid way that informs their formal and informal learning is critical to the success of our future.

Research Design

This non-experimental, correlational-design quantitative study examined the relationship between principal self-efficacy and principal technology behaviors. The PSES (Tschannen-Moran & Gareis, 2004) was the self-efficacy measure used in this study. While multiple instruments exist to survey principal self-efficacy (Dimmock & Hattie, 1996; Goddard, Hoy & Woolfolk Hoy, 2000; Hillman, 1986; Imants & Brandbander, 1996; McCollum, Kajs & Minter, 2005; Tschannen-Moran & Gareis, 2004; Wade Smith & Guarino, 2005), the length and the data garnered from the PSES provided sufficient data to study the relationship between a school
principal’s self-efficacy and self-reported technology behaviors. The PSES is comprised of three subscales: “efficacy for instructional leadership,” “efficacy for moral leadership,” and “efficacy for management”; each subscale consists of six items (Tschannen-Moran & Gareis, 2004).

Additionally, the PSES is rooted in the Interstate School Leaders Licensure Consortium (ISLLC) standards, which are also considered in principal preparation and evaluation (Lashway, 2003). The ISLLC standards are discussed further in Chapter 2.

The technology construct was measured using the Principal Technology Leadership Assessment (PTLA; CASTLE, 2009). The PTLA was designed by CASTLE, the UCEA Center for the Advanced Study of Technology Leadership in Education in the College of Education and Human Development at the University of Minnesota, and the American Institutes for Research (AIR). The National Education Technology Standards for Administrators (NETS-A) served as the foundation for this measure. The instrument includes 35 items across six subscales: 1) leadership and vision; 2) learning and teaching; 3) productivity and professional practice; 4) support, management, and operations; 5) assessment and evaluation; and 6) social, legal, and ethical issues.

Research Questions

In examining the existence of a relationship between school principal self-efficacy and technology practices, this study addressed the following research questions:

1. What is the relationship between overall principal self-efficacy and self-reported technology behaviors? Are gender, years in the role of principal, and total years working in education related to self-efficacy and technology behaviors?
2. What is the relationship between a school principal’s self-reported efficacy for management and self-reported technology behaviors?

3. What is the relationship between a school principal’s self-reported efficacy for instructional leadership and self-reported technology behaviors?

4. What is the relationship between a school principal’s self-reported efficacy for moral leadership and self-reported technology behaviors?

Delimitations

Delimitations are ways the researcher has narrowed the scope of the study (Creswell, 2003). In this study, the following delimitations were acknowledged:

1. The study sample was limited to public school principals in the state of Illinois.

2. The PSES (Tschannen-Moran & Gareis, 2004) was used to collect principals’ self-efficacy data. The PSES is made up of three subscales (efficacy for management, instructional leadership and moral leadership) with six items within each subscale, resulting in a total of 18 items.

3. The PTLA (CASTLE, 2009) was used to collect data about principals’ self-reported technology behavior. Additionally, the PTLA did not collect data related to why a principal engages in a particular behavior. In some instances, he or she may not have engaged in particular behavior because another staff member oversaw the stated task.

Definitions of Terms

Key terms are clearly defined in the PTLA directions (CASTLE, 2009). The definitions are aligned with the use of these terms throughout the study. Definitions are as follows:
**Assessment:** refers to the method of measurement used to evaluate progress. Student assessment typically refers to a method of evaluating student performance and attainment to determine whether or not a student is achieving the expected outcome(s).

**Digital divide:** refers to the perceived gap between individuals with access to computers and the internet and those who do not have access.

**Research-based:** refers to practice that employs systematic, empirical methods that draw on observation or experiment to provide reliable data. Research-based work uses research designs and methods appropriate to the posed research question and are presented in sufficient detail for replication. The strongest research-based practices typically obtain acceptance through peer-reviewed journals or expert panels.

**Self-efficacy:** is a key component of Albert Bandura’s social cognitive theory. Self-efficacious individuals believe they can increase their own skills and influence the environment in which they work.

**Technology:** generally refers to personal computers, networking devices and other computing devices (e.g., electronic whiteboards and personal digital assistants – PDAs). It also includes software, digital media, and communications tools such as the Internet, email, CD-ROMs, and video conferencing.

**Technology planning:** refers to any process by which multiple stakeholder groups (e.g., district administration, school administration, faculty, and parents) convene to develop a strategy for the use or expanded use of technology in instruction and operations. Technology planning need not be separate from other planning efforts, but it should be a recurring theme if integrated within a more comprehensive planning process.
CHAPTER 2
REVIEWS OF THE LITERATURE

Organizational Framework of the Review of the Literature

Two attendant areas must be examined when considering leader self-efficacy and technology behaviors. The first is the school leader’s general role with specific attention to technology integration. The second is an overview of the self-efficacy construct serving as the theoretical foundation for this study. Self-efficacy can then be further studied with regard to the way it is measured and the connection between self-efficacy and leadership. Boote and Beile (2005) maintain that a clear understanding of prior research is critical to taking steps forward. Therefore, this review of literature and the research itself were designed to unearth a connection between a school principal’s self-efficacy and the school principal’s technology behaviors.

Role of Leaders

Lashway (2003) examined various perspectives of the school principal’s role, acknowledging role definition is both a difficult task and an ongoing source of debate. Lashway asserts that not understanding the role puts one at risk of overloading this critical role. Seeking understanding, Lashway uses the Interstate School Leaders Licensure Consortium (ISLLC) as a lens. The ISLLC established standards connected specifically to principal preparation and evaluation. The standards are based on six areas: 1) shared vision, 2) school culture, 3) management of the organization, 4) family and community collaboration, 5) acting with integrity
and ethics, and 6) influencing the greater political, social, economic, legal and cultural context
Lashway suggests these roles are likely to be common among leaders in both school settings and
other settings. He also explores studies beyond this lens (Leithwood & Duke, 1999; Leithwood
& Riehl, 2003). Emergent principal roles include focused instructional leadership, leading
change, developing a collaborative leadership structure, and providing the moral center as
challenges of this role. In considering the challenges posed by these roles, Lashway notes, “just
trying harder may not help leaders who are confronting issues for which they have not been
trained” (p.8) and cites technology use as an example. He concludes leaders must ultimately
view themselves as learners in addition to doers if they are to lead effectively.

Leithwood and Duke (1999) explored six notions of leadership that expanded beyond the
school principal to connections and interactions, including instructional, transformational, moral,
participative, managerial and contingent. Leithwood and Riehl (2003) identified core leadership
practices including setting directions, developing people, and redesigning the organization.
On behalf of the Task Force on Developing Research in Educational Leadership, Leithwood and
Riehl (2003) considered a renewed emphasis on educational leadership, noting the two primary
leadership functions are “providing influence” and “exercising influence” (p. 3). They define
school leaders as those in both formal and informal roles who propel the school towards its
goals. Leith and Riehl purport leadership impacts student learning and that informal leadership
structures exist beyond the principal. They further note that leadership essentials such as
developing people, developing the organization and setting direction are critical. School leaders
must also respond to both the challenges and the opportunities of both a complex context and the
various student needs existing within that context. Leithwood and Riehl found that balancing
managerial tasks and leadership responsibilities is a leadership challenge.
Prior to Leithwood and colleagues’ work, Bass and Avolio (1994) studied the concept of transformational leadership. Transformational leaders were cited as having influence over their followers. Rather than the back and forth exchange associated with transactional leadership, there are four components of transformational leadership. They include idealized influence, intellectual stimulation, inspirational motivation and individualized consideration (Bass & Avolio). Idealized influence references the leader as a role model, considering the needs of others and acting in an ethical manner. Inspirational motivation comes with clear expectations and sparks meaning in the work of followers. With intellectual stimulation, leaders encourage creativity and foster a safe environment for trying new ideas. Finally, individualized consideration encompasses mentoring, professional learning, and ongoing interactions between leader and follower. Bass and Avolio contend, “Transformational leaders motivate others to do more than they originally intended and often more than they even thought possible” (p. 3).

Levin and Fullan (2008) studied the leader’s role in system renewal. They cited seven premises that can drive large-scale change including:

1. A small number of ambitious yet achievable goals, publicly stated.
2. A positive stance with a focus on motivation.
3. Multi-level engagement with strong leadership and a ‘guiding coalition’.
4. Emphasis on capacity building with a focus on results.
5. Keeping a focus on key strategies while also managing other interests and issues.
6. Effective use of resources.

Looking deeper into multi-level engagement with strong leadership, Levin and Fullan (2006) discussed the notion of permeable connectivity in which different levels of school leadership and community groups are focused on strategies producing interaction leading to betterment of the
education system. Like Leithwood and Riehl (2008), Levin and Fullan also assert leadership must intentionally be developed within and beyond formal leadership roles within schools and the community. Leadership must be action-oriented rather than merely planning-oriented. As leaders seek to actualize technology plans like those from the United States Department of Education Office of Educational Technology, thereby ensuring teachers and students have the tools for meaningful interpretation, they understand how their own leadership styles and technology interplay can elicit useful information.

Leadership Style and Technology

Previous studies have explored the connection between leadership style and technology (Afshari, Baker, Luan, Smah, & Fooi, 2009; Hadjithoma-Garstka, 2011). In a study of leadership style and its effect on the use of information and communication technologies (ICT), researchers in Malaysia sought feedback from Tehran, a province in Iran. The sample included 30 secondary school principals in that region. The researchers examined both the principals’ use of ICT in their schools and their leadership style (Afshari et al.). In this exploratory study, “the level of computer use [was] operationally defined as the self-reported use of computers and their software for administrative and instructional purposes” (p. 239). In this quantitative study, data were gathered regarding computer use, principals’ self-assessed proficiency levels, and principals’ leadership styles. Multiple instruments were used to collect data. Felton’s (2006) scale, made up of 39 items on a 5-point Likert scale, was used to measure computer use, while the Computer Competence Scale (Flowers & Algonzzine, 2000) was used to measure the principals’ self-reported skill beliefs on a 4-point Likert scale ranging from no competence to much competence. The Multifactor Leadership Questionnaire (MLQ; Bass & Avolio, 1997) was
used to measure leadership style.

Overall a moderate level of computer use was reported by principals. In sub-sections looking at Internet use, hardware and software use, instructional use, and administrative use, administrative use was the only sub-section falling below the mid-point of using a few times per week. There were no significant differences among the other four subsets.

With regard to self-reported competency levels, the principals reported a moderate level of competence as well. A higher mean score of competence was reported for transformational leadership than for transactional leadership. Looking at the correlation between the variables, there was a significant positive relationship between transformational leadership and computer use and between computer use and computer competence (Afshari et al., 2009). In evaluating the results, researchers found low levels of self-reported competence in database and spreadsheet use. This was a concern given the researchers’ beliefs about using those tools for school improvement. As a result, the researchers highlighted a need for professional development to support such skill development. The researchers also noted administrative use of computers ranked lower than instructional use, contradicting their pre-study belief that administrative use would increase instructional use (Afshari et al.). Noted limitations of this study included sample size and the self-reported nature of the results.

Another study explored four schools identified through survey data as implementing information communication technology (ICT) policy on a weekly basis. This study examined leadership in terms of personal qualities and implications for ICT policy implementation (Hadjithoma-Garstka, 2011). Through systematic random sampling, the survey was sent to 69 schools from a population of 348. Schools were sorted into high ICT use/high ICT level, high ICT use/low ICT level, low ICT use/high ICT level, and low ICT use/low ICT level. Use
referred to the frequency of staff ICT use; level referred to the amount of technology resources at the school. Four schools were chosen for case studies. All four of these schools were categorized as high use. Three were ICT high level, and the fourth was ICT low level. The four case studies included observations and interviews. Text from interviews and observations was categorized into themes from the survey or newly emergent themes from the case studies. Findings showed principals in these four schools supported ICT integration in multiple ways, including delegation of authority to school-based coordinators, support from a district coordinator, an informal community of practice made up of teachers, and a combination of district directors and skilled educators within the school itself. Hadjithoma-Garstka used Goleman’s (2000) leadership styles to describe principals. Their findings indicated an affiliative, or people-oriented, style was most present in the successful ICT implementing schools. Hadjithoma-Garstka suggested leadership style impacts the school culture, which then influences implementation. Since the affiliative, people-oriented, leadership style was present in the schools with high ICT use, Hadjithoma-Garstka also suggested policy-makers promote training for principals to enhance their own computer use and identify leadership style and practice that will positively impact ICT implementation at the onset. Additionally, Hadjithoma-Garstka recommended longitudinal studies to examine long-term findings related to leadership style in this arena.

School Principal’s Role in Technology Integration

Moving beyond leadership style, researchers have studied the school principal’s role in technology integration (Garland, 2009; Gosmire & Grady, 2007; Lecklider, Clausen, & Britten, 2009; Miranda & Russell, 2011). Gosmire and Grady examined the increasing financial investment schools linked to technology and the claim that principals need to be informed on
how to manage implementation. They recommend using the following 10 questions as a framework for doing so (p. 17):

1. What are the technology trends I need to know about?
2. What does the research say about schools and technology?
3. What do I need to know about technology to move my school forward?
4. Are there guidelines to help me?
5. How do I construct a safety net for technology in the school?
6. How do I know I have created effective policies and plans?
7. How do I promote the integration of technology in the classroom?
8. How much will all of this cost and where do I get the funds?
9. How do I work with technology experts?
10. How will I measure success?

Garland (2009) expanded the role of the principal beyond logistics into the ethical realm by considering ways to shrink the digital divide. The digital divide has been defined as the inequality of access in which some have access to computers and technology while others do not (Banister & Vannatta Reinhart, 2011). Garland’s analysis of research considered the social, legal, and moral issues. Legal issues were tied to the Internet use policy that accompanied increased use of technology within schools, including issues related to devices and Internet safety. Peripheral issues included cellular phone policy and adherence to copyright law. Upon synthesizing her research, Garland concluded, “the principal has a duty to become an informed activist in promoting access to technology by all students and teachers” (p. 40).

Lecklider, Clausen, and Britten (2009) examined the principal’s role based on how they prioritized the use of technology in the operation of and learning within their school as well as the degree to which technology was considered and embedded in professional development, school improvement, and budgets. Seventy-six educational leaders were surveyed, with two-thirds of the sample representing building principals. All considered areas were rated at a high level of priority, with budget being the lowest although 74% of respondents noted this to be a
high priority. The survey gathered observational data on use of technology by both teachers and students. The researchers noted it was critical to integrate technology across all facets of work within schools to increase the correlation between rated importance of technology and the level of consideration it is given in budget planning and its prevalence in instruction. The role technology played in meeting Adequate Yearly Progress and increasing administrator awareness of the National Educational Technology Standards (NETS) as a support tool within principal preparation programs, professional development, and the ongoing work of the public schools was further noted.

Miranda and Russell (2011) studied technology integration, including the principal use of technology, availability and accountability of standards, and principal discretion, in Boston-area school districts. At the teacher level, findings indicated that “teachers who are technology innovators may reach out to external sources for assistance with IT integration, whereas less innovative teachers may be less likely to use technology in instruction” (p. 318). The researchers also addressed responses to micro-level issues, including considering teacher IT experience in the hiring process and a focus on the benefits to the classroom. Looking beyond the teacher, Miranda and Russell noted macro-level factors, such as professional development plans, principal hiring, and principal autonomy in technology purchases. Further, the “results point[ed] to the importance of an entire school district culture committed to IT use, where district leaders set and enforce IT goals, encourage principals to make technology-related decisions, and communicate the importance of using technology across the organization” (p. 319).
Principal Perceptions of Competency and Attitude Toward ICT

In addition to conditions within a school, both the principal’s competency and attitude toward ICT has been studied by researchers (Anderson & Dexter, 2005; Banoglu, 2011; Papaioannou & Charalambous, 2011; Leonard & Leonard, 2006). In Istanbul, Banoglu studied the competency of school principals in the constructs of Leadership and Vision, Learning and Teaching, Assessment and Evaluation, and the more general Technology Leadership Competency” (Banoglu, 2011). Developed originally drafted in 2002, these categories were identified by the International Society for Technology in Education within the original NETS-A standards. The standards were revised in 2009. The study explored differences in practice among principals related to demographics, grade levels served by the school, and the inclusion of a staff technology coordinator. Eighty-three principal surveys were analyzed from a population of 134 principals in the Maltepe and Kadikoy districts in Istanbul. A Turkish translation of the Principals Technology Leadership Assessment (PTLA) was administered to study participants. The PTLA was originally developed by CASTLE, the UCEA Center for the Advanced Study of Technology Leadership in Education in the College of Education and Human Development at the University of Minnesota, and the American Institute for Research (AIR). The instrument was aligned with the National Education Technology Standards for Administrators (NETS-A), now known as the ISTE Standards, for the purpose of assessing principal technology leadership practices. The instrument contained 35 items within the categories maintained in the Turkish translation previously noted: (1) leadership and vision; 2) learning and teaching; 3) productivity and professional practice; 4) support, management, and operations; 5) assessment and evaluation; and 6) social, legal, and ethical issues. Items were scored using a 5-point Likert scale
The PTLA’s reliability and validity was established by CASTLE and the American Institute for Research (AIR). With regard to validity, 10 content experts reviewed the draft instrument and scored each item for its alignment with NETS-A and for the item’s quality; the inclusion of comments from the reviewers was also permitted. Revisions were made to address quality ratings, with two items being deleted and four being added. The instrument was then piloted with 74 school principals. Reliability was analyzed for the entire instrument and each of the six subsections. A Cronbach’s Alpha of 0.95 indicated high reliability. Of the six subsections, Productivity and Professional Practice showed lower reliability with a Cronbach’s alpha of 0.65. On the whole, the subsections did not contain a sufficient number of items to be considered independently; again, however, the reliability on the whole was strong (CASTLE, 2009).

Banoglu (2011) established construct validity on the translated instrument using confirmatory factor analysis and exploratory factor analysis. Internal consistency was established with a Cronbach’s alpha coefficient ($\alpha = 0.95$). Findings indicated significant engagement in technology leadership overall. Also in the sublevels of data, leadership and vision produced the lowest mean score of the six subscales of the PTLA adaptation (CASTLE, 2009). Moreover, the role of technology coordinators was related to the principal’s elevated role in teaching and learning. Gender discussions also emerged in considering the communication styles of male principals and female principals, with female principals being seen as more collaborative and positively impactful in the domain of teaching and learning. In this study, female principals scored higher than their male counterparts in leadership and vision.

Papaioannou and Charalambous (2011) sought a deeper understanding of information and communication technology (ICT) factors impacting technology integration in primary schools. In
their mixed-methods study, they surveyed primary school principals in Cyprus and selected a smaller sample for interviews from the respondents. The population included 336 public school principals in Cyprus during the 2007-2008 school year. Surveys were sent to 250 principals using stratified random sampling to meet the target response rate of 180 principals. Principals were given an instrument with 55 items on which principals self-reported their attitudes on a 5-point Likert scale. The instrument’s subscales included enthusiasm/enjoyment, anxiety, avoidance, negative impact on society, and productivity. Internal consistency reliability was established with Cronbach’s alpha (α=.70). Descriptive statistics were also used for further analysis. Marshals’s (1996) criterion for purposeful sampling was used to select the eight subjects for the qualitative portion of this mixed-methods study. Semi-structured interviews were conducted and data were analyzed using qualitative content analysis (Mayring, 2000).

Within the sample of the eight principals selected for interviews, school size, type of school, and self-reported ICT competency varied. All eight principals in the sample had average experience exceeding thirty years. Survey results from the quantitative portion of this study indicated the principals had a positive attitude toward ICT, but they were hesitant in affirming the impact of computers on the larger society based on concerns that computers can isolate people from one another and dehumanize individuals. An analysis of the independent variables looked at gender, years of service, academic qualifications, access to a home computer, home Internet access, training, computer experience, and presence of a computer in the principal’s office. The analysis indicated principals who received professional development demonstrated more enthusiasm regarding ICT. Responses from the principals selected for interviews indicated, “principals experienced in using computers referred to the importance of the existence of inspiring and competent leadership during the ICT integration process” (Papaioannou &
Charalambous, 2011, p. 359). With regard to gender, there was statistical significance in the number of males scoring higher than females in the three subscales measuring enthusiasm surrounding computers, less anxiety with computers, and less likely to think computers will negatively impact society.

In the qualitative portion of the study, interviews focused on factors that either facilitate or inhibit ICT integration in Cyprus primary schools. The factors were divided into the categories of external factors and internal factors. Internal factors included involvement of stakeholders, acceptance of innovation by teachers, in-service training, and a capable ICT coordinator in the school. External factors included student background knowledge of ICT, number of computers per class, support from the larger educational organization, and technology support maintenance. All but one of the eight interviewed principals noted collaboration between schools and their district’s technology coordinator promoted success in integration. Additionally, a greater number of district level staff delegated to ICT support showed a positive impact on ICT success (Papaioannou & Charalambous, 2011). The researchers concluded controlling external factors was not the key to ICT success, instead the vision and action plan were the critical factors.

Leonard and Leonard (2006) also affirmed the importance of the principal’s vision. They studied technology integration in 251 schools across 12 North Louisiana school districts. The researchers sought to obtain principals’ and assistant principals’ perceptions of technology planning/access and faculty orientations/skills. The instrument included demographic items, 15 yes-no items, and two open-ended items. Demographic items included grade levels served by the school, student enrollment, gender of the principal, population served by the school (i.e., urban/rural/suburban), and administrator years of experience). While it was noted that gender of
the principals location was evenly split across the sample, results particular to each gender were not reported out. The same is true of years of experience, in which the sample was made up of principals and assistant principals with mostly 3-10 years of experience (48.6%). Overall, 96% of the respondents cited technology integration as an important goal for their school, yet only 56% felt prepared to lead such efforts. Within the open-ended questions, 87% of respondents stated they needed to increase their knowledge of effective technology integration. Ongoing professional development and time in classrooms were cited as possible ways to bolster their efforts to lead.

Dexter and Anderson (2005) developed a model for considering the external factors influencing technology leadership. The model suggests interplay between infrastructure and technology leadership. Technology leadership indicators included a technology committee, school technology budget, district support, principal e-mail, staff development policy, grants, intellectual property policy, and days devoted to technology by the principal (Anderson & Dexter, 2005). Technology leadership influences technology outcomes, including internet use, technology integration and student use of devices. Data to support Dexter and Anderson’s model were taken from the Teaching, Learning and Computing National Survey (Becker & Anderson, 1998). This survey solicited information from principals, teachers, and technology directors. A probability sample included 898 schools out of a possible 109,000. Additionally, purposive samples were taken from 258 high technology use schools and 470 schools engaging in a formal educational reform process.

The study indicated which schools demonstrated each technology leadership indicator, technology policy adoption, leadership indicators related to demographic items, and the relationship between technology leadership and technology outcomes (Anderson & Dexter,
A technology committee (79%), a staff development policy (82%), intellectual property policy (76%), more than principal days devoted to technology (59%), and a school technology budget (53%) were found in a majority of the schools involved in the study. Grants (43%), principal emails with different stakeholders (29%), and district support of technology (33%) were found in less than half of the participating schools. Dexter and Anderson (2005) noted the small percentage using email with multiple stakeholder groups may “suggest that principals may be slower in changing their own personal practice in using technology than they are in implementing school technology programs and policies” (p. 61).

These policies were disaggregated into 10 policy types and considered by school level. The most commonly adopted policy across levels was “prohibition of use of adults-only material” (Anderson & Dexter, 2005, p. 63). Sixty-three percent of the schools had enacted at least six of the 10 noted policies, with a greater adoption rate at the secondary school level. Likewise, technology leadership was identified as more prevalent in secondary schools overall, based on the indicators outlined earlier. Private schools also rated lower than public schools in this domain, and schools with more students in a lower socioeconomic bracket rated lower than those with fewer low SES students (Anderson & Dexter). Finally, multiple regression analyses were performed to explore the relationship between independent and dependent variables. The three dependent variables were “net use,” “technology integration,” and “student tool use,” while the independent variables were “technology leadership,” “students per computer,” “T1 access,” “per student hardware expenditures,” and “per student software expenditures” (p. 71). T1 access refers to each school’s high speed internet access. Of the variables, technology leadership proved to be the most impactful on each of the dependent variables. Technology leadership also had the largest correlation with technology outcomes.
Technology integration is one of many challenging tasks of modern-day educational leadership, impacted by complex internal and external variables (Anderson & Dexter, 2005; Banoglu, 2011; Garland, 2009; Gosmire & Grady, 2007; Lecklider, Clausen, & Britten, 2009; Leonard & Leonard, 2006; Miranda & Russell, 2011; Papaioannou & Charalambous, 2011). In seeking to support school leaders, one must consider what has the potential to bring leaders success amidst the challenges. Tschannen-Moran and Gareis (2004) summarized the work of Wood and Bandura (1989) stating, “A robust sense of efficacy is necessary to sustain the productive attentional focus and perseverance of effort needed to succeed at organizational goals.” This necessitates a closer look at the self-efficacy construct and the role it plays in school leadership and leadership for technology.

Self-Efficacy

In addition to researching the impact of school principal technology roles and experiences, this study examined school leaders’ overall self-perceived levels of self-efficacy. Self-efficacy emerged as a key tenet from Albert Bandura’s 1977 study of social cognitive theory as articulated in his seminal work “Self Efficacy: Toward a Unifying Theory of Behavioral Change.” Bandura differentiated between efficacy expectations and outcome expectations. Efficacy expectations link the person and the behavior, while outcome expectations link the behavior to the outcome. For example, a principal might acknowledge the outcome expectation that engaging in technology behaviors is needed to effectively lead in a technological age. Efficacy, however, explores the principal’s belief that he/she may successfully engage in such behaviors. Bandura (1977, 1999) further noted efficacy expectations can also impact both the level and duration one with which perseveres toward a given outcome as well as his or her
choice of activities. Enhanced self-efficacy can be generalized to previously challenging situations and, therefore, may influence future considerations (Bandura, 1999; Bandura, Jeffrey & Gajdos, 1975).

Bandura (1977, 2000) also found efficacy expectations can vary in magnitude, generality, and strength. He suggested these expectations could also be based on performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal with different modes of induction. For example, Bandura (1977) also linked performance accomplishments with vicarious experience. Bandura (2000) also cited strategies for developing leader self-efficacy, including guided mastery, cognitive mastery, and self-regulatory competences.

Bandura (1986, 1997) also examines triadic reciprocal causation. There is a behavior component, a personal component, and an environmental component. The environmental facet encompasses an imposed, selected, and constructed environment. The personal facet includes biological, emotional, or affective and cognitive elements. Essentially, the components all influence one another. This also implies that behaviors are shaped by both internal and external factors.

Measurement of Technology Self-Efficacy

**Compeau and Higgins’ Measure**

Computer Self-Efficacy (CSE) has been measured through multiple scales (Compeau & Higgins, 1995; Karesten, 2000; Murphy, Coover, & Owen, 1989). Compeau and Higgins’s measure of CSE begins by informing participants that they will be responding to questions about using a new, un-named software program for a generic project. The measure includes 10-items
that increase in difficulty as one progresses through the scale. Respondents answer “yes” or “no” to each question. For yes responses, participants rate their confidence on a 10-point Likert scale. This measures the magnitude, as measured by the number of yes or no responses, and strength of CSE, measured by the overall score from the Likert scale.

**Murphy Coover and Owens Measure**

This measure of CSE is made up of 32-items that reference a cross-section of technology skills. Participants rate their confidence on a 5-point Likert scale (Murphy et al., 1989). This measure references aspects of CSE that are no longer relevant, such as floppy disks. The Likert scale yields a score for CSE strength.

**Measurement of Principal Self-Efficacy**

In addition to the measurement of technology self-efficacy, the measurement of principal self-efficacy has been explored across multiple studies (Dimmock & Hattie, 1996; Goddard, Hoy & Woolfolk Hoy, 2000; Hillman, 1986; Imants & DeBrandbander, 1996; McCollum, Kajs & Minter, 2005; Tschanen-Moran & Gareis, 2004; Tschanen-Moran & Woolfolk Hoy, 2001; Wade Smith & Guarino, 2005;). Dimmock and Hattie were the earliest researchers who sought to capture a school principal’s sense of efficacy. Tschanen-Moran and Gareis developed their own instrument, the Principal Sense of Efficacy Scale (PSES; 2004), to more accurately capture principal self-efficacy following analysis of those earlier measures (Dimmock & Hattie; Hillman; Imants & DeBrandbander).
Hillman's Efficacy Measures

Hillman (1986) created student, teacher, and principal efficacy measures. The original sample for the principal measure included 44 principals from Indiana. Each of the 16 scenarios included in this instrument listed four possible reasons why each situation evolved. Respondents responded on a 5-point Likert scale for each of the four possible reasons. The student and teacher instruments followed the same design. A strength of Hillman’s work was consideration of multiple views of efficacy as opposed to considering only one view. The alpha levels supported the self-efficacy construct, and the instrument was determined to be valid both in whole and by subscale.

Imants and DeBrandbander’s Teacher and Principal Sense of Efficacy Scale (TPSEs)

Imants and DeBrandbander (1986) created the Teacher and Principal Sense of Efficacy Scale (TPSEs). This instrument measured self-efficacy and school efficacy. The sample for this study was generated when each of 267 Dutch schools received a questionnaire for the principal and two questionnaires for teachers. The instrument lists eight student-related tasks and eight school-related tasks, with each task measured on a 5-point Likert scale. Respondents rated their own efficacy and their perception of the school efficacy related to each of the 16 total tasks. Demographic information, including role, gender, grade level, and experience was collected. Kindergarten staff were looked at separately from elementary grade staff. Related to gender, little differences emerged among professionals with a low level of experience, while more experienced male respondents showed a higher level of self-efficacy. The more experienced males also showed an increase in school-level tasks. Females maintain a stronger orientation to student-related tasks and school efficacy.
Prinses

Dimmock and Hattie’s (1996) measure, known as Prinses, is a qualitative measure consisting of 12 scenarios exploring school development planning; teaching, learning, and curriculum; managing staff; budgeting, managing parents; and managing the environment. Ten primary school principals and 10 secondary school principals were randomly selected from Western Australia as the sample for the first phase of developing the instrument. These principals submitted challenges or problems they had recently experienced in their roles as principals; in particular, they were asked to consider situations related to restructuring and change. From 52 submitted situations, 12 were selected and restructured resulting in the final measure.

Principal Sense of Efficacy Scale (PSES)

Tschannen-Moran and Gareis (2004) developed the Principal Sense of Efficacy Scale. The researchers first abandoned existing measures they did not deem appropriate to integrate into their study. First, Tschannen-Moran and Gareis eliminated Imants and DeBrandbander’s (1986) Teacher and Principal Sense of Efficacy Scale based on their belief it predictably showed principals were concerned with school level tasks and teachers were concerned with student-related tasks. Tschannen-Moran and Gareis (2001) also eliminated Hillman’s (1986) measure, as they found the forced choices to be a contradiction to Bandura’s belief that efficacy should be measured along a continuum of beliefs. They also believed the theory behind Hillman’s instrument to be attribution theory more so than the social cognitive theory with which self-efficacy is aligned.
Next, Tschannen-Moran and Gareis (2004) conducted three studies using three different instruments. They included Dimmock and Hattie’s (1996) tool, a new measure based on Goddard et al. (2000) and a new measure based on the TSES developed by Tschannen-Moran and Woolfolk Hoy (2001). While Dimmock and Hattie’s (1996) original work was developed in Australia, this version contained nine scenarios common to American school principals. Principals used a 10-point Likert scale to rate their level of confidence in those scenarios. Ninety-seven of 152 schools contacted by the researchers agreed to participate in the study, yielding a sample of 104 Ohio public high school principals and assistant principals. Researchers visited the schools to administer the surveys, and data were analyzed with principal axis factoring with Varimax Rotation. Low communalities, low factor loadings, and low item-total correlations caused Tschannen-Moran and Gareis (2004) to consider the stability and reliability, thus leading to a decision not to use Dimmock and Hattie’s (1996) instrument as a principal self-efficacy measure in their next phase of study.

The second instrument examined by Tschannen-Moran and Gareis (2004) was a teacher efficacy scale. Goddard, Hoy and Woolfolk Hoy (2000) designed this teacher collective efficacy 22 item instrument measuring collective teacher efficacy. Tschannen-Moran and Gareis used an adaptation of this instrument as part of their study of leader efficacy. In this part of the study, participants responded on a six-point Likert scale; items related to task analysis and one’s perception of his or her own capacity. The sample included 104 Ohio high school principals and 53 Virginia middle school principals and assistant principals. The data were analyzed with principal axis factoring with Varimax rotation. Data analysis resulted in low factor loading and a Cronbach’s alpha of 0.79.

Tschannen-Moran and Gareis (2001) created the PSES for their third study. This aligned
with Tschannen-Moran and Woolfolk Hoy’s (2001) TSES. Based on Bandura’s (2001) assertion that efficacy beliefs should be rated as points on a continuum, the PSES used a nine-point Likert scale ranging from “not at all” to “a great deal” (Tschannen-Moran & Gareis, p. 579). The ISLLC professional standards served as a source for the initial pool of 50 items. In its final form, the PSES includes 18 of those items across the subscales of efficacy for management, efficacy for instructional leadership, and efficacy for moral leadership. All items used the stem, “In your current role as principal, to what extent can you…” to prompt participants to consider their context in responding (p. 584). The directions also prompted the respondent to consider his or her current role. A work alienation scale and demographic information rounded out Tschannen-Moran and Woolfolk Hoy’s study.

The sample for the initial PSES validation study included 544 Virginia public school principals at all levels; the total population included 1925 principals. Surveys were sent by mail to the total population. Using principal axis factor analysis, 32 items were removed based on communality lower than 0.30, loading on a principle factor of less than 0.40 or loading on more than one factor. Emergent subscales included self-efficacy for management, self-efficacy for instruction, and self-efficacy for moral leadership. Construct validity was established by looking at the relationship between self-efficacy and work alienation, self-efficacy and trust in teachers, and self-efficacy and trust with students and parents. A negative relationship emerged with work alienation, while positive relationships were identified in the areas of trust. No significance emerged in the relationship between self-efficacy and gender nor between self-efficacy and socioeconomic status. This measure will be explored further in Chapter 3, as it is the instrument used in the current study.
Principal Self-Efficacy Scale

The Principal Self-Efficacy Scale (PSES) is a third measurement tool that includes the two subscales of instructional leadership and management skills (Wade Smith & Guarino, 2005). This scale has 14 items, each measured on a four-point Likert scale. The sample for this study included 284 principals from 12 states. Confirmatory factor analysis was used to analyze the data. The chi-square test was used as an absolute fit measure, from which the correlated two-factor model emerged as the best model. While the scale was determined to be valid in this exploratory study, Wade Smith and Guarino (2005) noted additional studies using this instrument would be needed to reaffirm the initial findings.

School Administrator Efficacy Scale

McCollum, Kajs, and Minter (2005) developed the School Administrator Efficacy Scale (SAES) based on the Educational Leadership Constituent Council (ELCC) Standards and the Interstate School Leaders Licensure Consortium (ISLLC). The SAES measured 51 items across eight subscales: 1) Instructional Leadership and Staff Development; 2) School Climate Development; 3) Community Collaboration; 4) Data-based Decision Making Aligned with Legal and Ethical Principles; 5) Resource and Facility Management; 6) Use of Community Resources; 7) Communication in a Diverse Environment; and 8) Development of School Vision. The sample for this study included 544 early career principals and aspiring principals. Confirmatory factor analysis prompted the rejection of the null hypothesis and the affirmation of the SAES and its eight subscales in the good ($\alpha=0.81$) to excellent ($\alpha=0.95$) range (2005). Researchers note this tool is useful for self-assessment of school leaders and also in designing and modifying
administrator preparation programs.

The previously examined measures were used across multiple studies exploring leadership and self-efficacy. Linking leadership and self-efficacy, Bandura (1993) cited two cognitive philosophies of inherent capacity and acquired skill. The amount of control one believes to have on his or her work environment is also a factor. A more successful leader is one who believes he or she can influence his or her skill acquisition and impact his or her work environment.

Self-Efficacy and Leadership

Many researchers have explored the connection between leadership and self-efficacy (Leithwood & Jantzi, 2008; Lyons & Murphy, 1994; Osterman & Sullivan, 1994; Tschannen-Moran & Gareis, 2004). Osterman and Sullivan studied the attitudes, goals, leadership role, and impact of the school system on new principals in New York City. The sample included 12 principals from the total of 216 new principals in the New York City Public Schools during the 1991 school year. All 216 principals were given a 38-item instrument utilizing both open-ended and forced response questions. The initial survey’s goal was to identify a sample by eliciting information about leadership paradigm and social factors. Survey responses were analyzed for assignment to the following three categories aligned to role expectations; traditional (strong leadership, test scores, safety), effective schools (goals, mission, climate, expectation), and/or transformational leadership (vision, collaboration, community). As part of the survey, principals considered the three stakeholder groups they considered most influential and their own standards for being seen as effective principals by those groups. Those questions along with school district demographics, district hiring policies, and accessibility of the principals were used to identify a
sample of 12 principals for the interview phase of study. The researchers interviewed the principals in their offices and toured each building with the principal. Five open-ended questions were asked over a one and a half hour time period. The researchers conducted a literature review and engaged in open coding to identify themes within the interview transcripts and axial coding to identify subcategories within each theme.

Emergent themes in the data included role perceptions, factors influencing role perceptions, principals’ own role models, principals’ university experience in their administrator preparation programs, and the influence of district expectations of principals on principal behavior. Other themes included school conditions such as academic achievement and school culture. Through the interview process, Osterman and Sullivan (1994) also learned about organizational conditions that existed when the principal entered the school, social conditions within the community, and principal efficacy. Organizational conditions included the principal that preceded them and adequacy of resources. Examples of social conditions that emerged included financial and emotional status. Osterman and Sullivan used “the criteria of optimism, perceived success, and positive orientation” to determine levels of self-efficacy (p. 23). They found six of the twelve interviewed principals to be highly self-efficacious, mixed results from five principals, and one principal with extremely low self-efficacy. They also noted the principals faced comparable challenges. The study suggested socioeconomic status, academic achievement, and school size were not related to a principal’s sense of efficacy.

The factors found to be related to a principal’s sense of efficacy included behavioral consistency, flexibility, consideration, and support (Osterman & Sullivan, 1994). Behavioral consistency is defined as acting in congruence with one’s leadership beliefs. Flexibility referred to adjusting goals and strategies to align with school conditions and needs, and consideration
referred to utilizing transformational leadership strategies. Support referred to the number of sources of support principals identified. Overall, principals with high efficacy were more likely to maintain their beliefs, adjust to situations, and move forward when faced with challenges. Principals with low efficacy were less confident when changing course and perceived less opportunity to do so.

Principals with low efficacy were also more likely to use external power sources (Lyons & Murphy, 1994). Externally based power included legitimate power that came through position, coercive power based on ability to punish and the power to reward. By contrast, internal power sources included expert and referent power. Lyons and Murphy used a self-efficacy instrument developed by Hillman (1983), described in the measurement section of Chapter 2, to collect data from 121 principals in an urban district in western United States. Demographic information was also collected; this information included grade levels served by the school, number of years of principal experience, each principal’s gender, each principal’s age and number of courses taken related to leadership or power (Lyons & Murphy). The second phase of the study included 25 principals from the initial population. Principals in this sample must have completed one year in their current assignments and be willing for a 10% random sampling of their teachers to complete an instrument measuring each principal’s use of power. Consistent with the results from previous research, demographic variables were not significantly related to self-efficacy. Other findings included a negative correlation between years of experience and self-efficacy and a significant relationship between use of internal power and self-efficacy. There was no relationship between gender and self-efficacy in this study. Principals with a longer tenure in their current position also were more likely to use external power sources.

In a separate study to that described in the Measurement of Principal Self-Efficacy
section, Tschannen-Moran and Gareis (2005) examined high versus low principal self-efficacy again. In addition to the 18-item Principal Sense of Efficacy Scale described later in Chapters 2 and 3, the researchers also included demographic variables, information regarding each participant’s principal preparation program, interpersonal support, if the respondents would make the decision to become principals again and variables of their school context. Variables of the school context included level of students served and the geographical setting of the school, such as rural, urban or suburban. The sample included 558 of 1925 principals in Virginia public schools. This equated to a 29% response rate. The sample was determined to be representative of the total population in terms of demographics and school settings.

Tschannen-Moran and & Gareis (2004) first used descriptive statistics to examine data. The authors examined the principals’ sense of efficacy and gender, race, and whether one would choose to be a principal again. They also conducted a hierarchical multiple regression in which they looked at demographic followed by preparation, context variables of setting and level of students served. Tschannen-Moran and Gareis also looked at additional variables such as district support, resources, and facilities. After establishing high reliability across subscales, the full scale was used to consider other results. Race was mildly correlated to principal self-efficacy, while years of experience and gender showed no statistical significance. Quality (r = .28, p < .01) and utility (r = .31, p < .01) of the principals’ training program was noted to be significantly correlated to self-efficacy. Materials and funding were most closely related (r = .38, p < .01) within the context variables, followed by facilities (r = .21, p < .01). With regard to variables related to support, there was a significant positive correlation between self-efficacy and superintendent, central office, teachers, staff, parents, and students, respectively. Teacher support was the most significant single variable. Within the regression analysis, gender, preparation,
school socioeconomic status, resource support, faculty support, and parent support were cited as contributors to principal self-efficacy. Tschannen-Moran and Gareis noted gender did not emerge as significant until considered with interpersonal support, suggesting women may be more proficient in connecting with support from others. Further, the researchers noted years of experience were not significant. This result comported with Bandura’s (1997) initial assertion that once established, self-efficacy beliefs remain stable. Principals with higher self-efficacy also reported being more likely to pursue the principalship if given the choice again.

Leithwood and Jantzi (2008) studied school leader efficacy and its indirect impact on student learning. They stated that efficacy beliefs include beliefs about one’s own self-efficacy and beliefs tied to the collective capacity of others within the system. Leithwood and Jantzi’s initial review of the literature explored factors that influence leader self-efficacy and the consequences of leader efficacy noted by previous researchers.

Leithwood and Jantzi (2008) categorized antecedents to leader self-efficacy as personal, school level, district level, and other. Gender, race, age, and years of experience were examples of personal antecedents. Location, level served, student socioeconomic status, and facilities were examples of school antecedents. Superintendent, principal autonomy, and parents’ support were examples of district antecedents. Quality and usefulness of principal preparation and courses taken were represented in the Other category. The researchers cross-referenced the 33 total antecedents with their prior research and found 24 were explored in one prior study; some antecedents were explored in two studies and four antecedents were explored three to five previous times. Leithwood and Jantzi (2009) reported insignificant or varied results in those studies considering leader gender (five studies), years of experience (four studies) and level of education (four studies). Overall, district level antecedents were studied less than personal or
school level antecedents.

Consequences of leader efficacy were categorized into personal and school level (Leithwood & Jantzi, 2008). Personal examples included type of power used, task preference, conflict management style, and role innovation. School level examples included student achievement, individual learning and self-development, and teacher motivation and behavior. The literature review also uncovered five sets of school conditions that impacted student learning. These five school conditions included school structures, school cultures, instructional policies, instructional practices, and human resources. Classroom conditions that impacted student learning were identified as workload, areas of formal preparation, student grouping, and curriculum and instruction. The noted effects are varied, as was the case with antecedents.

The sample for Leithwood and Jantzi’s study (2008) study included 96 principals and 2,764 teachers and was gathered using stratified random sampling. The first sample was drawn from different states. The second level sampled districts within those states, and the third sample drew from schools within those districts. A teacher survey and a principal survey were used to gather information, and student achievement data were reviewed for the corresponding schools. Student achievement data included whole school results on required language arts and mathematics tests for 2003 through 2005; these data were collected from public state websites.

Within their instrument, Leithwood and Jantzi (2008) used the items from the instructional leadership subscale of Tschannen-Moran and Hoy’s (2001) Principal Sense of Efficacy Scale. This instrument will be reviewed further later in Chapter 2 and Chapter 3. The researchers also added a scale to measure leader collective efficacy related to school improvement along with demographic variables and organizational characteristics, such as school district type and size. Student achievement data from state testing was used to determine a
school average based on meeting or exceeding standards in the areas of math and language arts. “Individual teacher responses were aggregated to the school level that were then merged with principal responses to the school administrator survey” (Leithwood & Jantzi, p. 513).

Leithwood and Jantzi (2008) considered variables that could impact the following relationships: district leadership, district conditions, and leader efficacy; leader efficacy, classroom conditions and school conditions; and leader efficacy and student achievement. Principal gender, experience, and race/ethnicity were noted as variables that did not influence those relationships. In addition to student achievement, the size of the district, school level, and principal turnover moderated the relationship between efficacy and class and school conditions. Among the findings, the researchers also noted the relationship between leader behavior and efficacy was weaker than expected.

Self-Efficacy and Technology

While self-efficacy and leadership have been studied in tandem, a limited number of studies have examined the link between self-efficacy and technology (Kiriakidis, 2012). Kiriakidis explored how the use of Skype for online communication impacted school administrator self-efficacy. This was a case study conducted in a single school district, sampling 17 district administrators and 22 building administrators. All participants received a webcam, a Skype account, and a directory of other participants. An interview protocol was developed and piloted by the researcher. The interviews were approximately one hour in length and contained open ended questions. Responses were member checked, which means they were reviewed by the interviewee himself or herself. They were then coded and analyzed. Findings indicated Skype increased administrator self-efficacy due to enhanced communication within each
administrator’s peer group, increasing efficiency, mentoring, and collaboration. Given the minimal number of studies, including Kiriakidis, further research is warranted to examine the intersection of leader self-efficacy and leader technology behaviors.

Research Questions & Hypotheses

While studies have been conducted related to leadership and self-efficacy and leadership and technology, few studies exist considering the self-efficacy and the technology behaviors of leaders. Research questions from Chapter 1 are restated below and paired with research that supports the inclusion of each question.

Research Question 1

Research question 1 asks “What is the relationship between overall principal self-efficacy and self-reported technology behaviors? Are gender, years in the role of principal and total years working in education related to self-efficacy and technology behaviors?”

Hypothesis 1

Hypothesis 1 states that there will be a significant relationship between overall principal self-efficacy and self-reported technology behaviors. Existing research showed that self-efficacy helps leaders persist through complex challenges and move forward organizationally (Bandura, 1977; Wood & Bandura, 1989). Bandura’s (1986, 1997) theory of triadic reciprocal causation indicated there is interplay between behaviors and both internal and external factors. Tschannen-Moran and Gareis (2004) used this theory to connect self-efficacy and behaviors. In opposition to the hypothesis, Leithwood and Jantzi (2008) found a weaker than expected relationship
between leader efficacy and behaviors. Supporting research was found within the federal government and the global market demands for technology-ready individuals. Deductively, technology integration in schools is likely to be among the complex issues faced by such leaders. Instructional leadership, moral leadership and management emerged both within leadership studies and as the subscales in the PSES (Tschannen-Moran & Gareis). Similar scales were also found within the PTLA (i.e., learning and teaching; support, management and operations; and social, legal, and ethical issues) (CASTLE, 2009).

**Hypothesis 2**

Hypothesis 2 states there are significant relationships between principal self-efficacy and self-reported technology behaviors for both males and females. In previous studies examining combinations of self-efficacy and technology variables, the impact of gender was inconsistent across both variables. Females were seen as more collaborative communicators, more involved in teaching and learning, and more likely to engage in leadership and vision behaviors (Banoglu, 2011). Imants and DeBradbander (1996) reported little differences in efficacy among professionals of each gender with a low level of experience, while more experienced male respondents showed a higher level of self-efficacy. The more experienced males also showed an increase in school-level tasks. Females maintained a stronger orientation to student-related tasks and school efficacy. Papaioannou and Charalambous (2011) found men to be less fearful of computers and technology use. Other studies did not find gender to impact the self-efficacy variable (Leithwood & Jantzi, 2008; Tschannen-Moran & Gareis, 2004).
Hypothesis 3

Hypothesis 3 states that self-efficacy, years as a public school principal, and years of experience in any public education role together will predict technology behaviors. Experience, like gender, was not found to be consistently influential in the literature (Banoglu, 2011; Leithwood & Jantzi, 2008; Papaioannou and Charalambous, 2011; Tschannen-Moran & Gareis, 2004). Lyons and Murphy (1994) found a negative relationship among years of experience, self-efficacy, and the leaders’ use of power. Bandura noted, however, that experiences can alter one’s self-efficacy in time (1977). Dexter and Anderson (2005) noted that principals may take longer to change their own practice than to lead others in change, so total number of years provides a second way to view experience. Given this topic is an emerging research area, further study is needed to broaden the knowledge base and strengthen understanding of relationships among the variables. Each of the questions was explored using linear regression analysis. The statistical data analyses are explained in greater detail in Chapter 3.

Research Question 2

Research question 2 asks, “What is the relationship between a school principal’s self-reported efficacy for management and self-reported technology behaviors?”

Hypothesis 4

Hypothesis 4 states that there will be a significant relationship between a school principal’s self-reported efficacy for management and self-reported technology behaviors. In addition to the research regarding overall self-efficacy and technology behaviors, Lecklider, Clausen, and Britten (2009) found that school principals consider the use of technology in budget planning and other building systems to be important. Additional studies supported the connection
between procedural tasks and technology (Banoglu, 2011; Miranda & Russell, 2011), which aligned with the efficacy for management subscale.

Research Question 3

Research Question 3 asks, “What is the relationship between a school principal’s self-reported efficacy for instructional leadership and self-reported technology behaviors?”

Hypothesis 5

Hypothesis 5 states that there will be a significant relationship between a school principal’s self-reported efficacy for instructional leadership and self-reported technology behaviors. In addition to the research regarding overall self-efficacy and technology behaviors, Lecklider, Clausen, and Britten (2009) found that school principals consider the use of technology in professional development and instruction to be important. Additional studies supported the connection between goal-setting, instructional leadership and technology (Banoglu, 2011; Miranda & Russell, 2011).

Research Question 4

Research Question 4 asks, “What is the relationship between a school principal’s self-reported efficacy for moral leadership and self-reported technology behaviors?”

Hypothesis 6

Hypothesis 6 states that there will not be a significant relationship between a school
principal’s and self-reported efficacy for moral leadership and self-reported technology behavior. In addition to the research on overall self-efficacy and technology behaviors, there was mixed research on moral leadership. Technology can be used to build a media presence and connect with the community, which aligned with the PSES subscale of efficacy for moral leadership. Some researchers believed it can also alienate people from one another by reducing interpersonal interactions (Papaioannou & Charalambous, 2011). Given the conflicted and limited research, the emergence of a relationship between efficacy for moral leadership and technology was not predicted. All research questions were examined via regression analyses.

Additionally, exploratory analyses in the form of simultaneous multiple regressions were conducted to explore relationships between subscales of the PSES (Tschannen-Moran & Gareis, 2004), both experience variables and all but one subscale in the PTLA (CASTLE, 2009). Data analyses are further detailed in Chapter 3 of this study.
Participants

Participants were individuals employed as principals in Illinois public schools serving students ranging from early childhood through Grade 12. There are approximately 3,400 public school principals in Illinois. While all principals were invited to participate, 328 completed the survey for a return rate of 9.7%. Of the initial invitations sent, 130 were returned as undeliverable due to the email filter of the receiving organization or changes in employment of the individual. Of the 339 who started the survey, four did not give consent to continue and seven were directed out after stating they were not an Illinois public school principal. Two additional individuals emailed the researcher that they were not an Illinois public school principal and three emailed that they did not have time to participate.

The sample was made up of 158 males and 163 females; seven respondents did not report gender. Approximately two-thirds of respondents had a master’s degree; other respondents had an educational specialist degree (21%) or a doctorate (15%). The mean number of years in public education was 19.85, while the mean number of years employed as a public school principal was 6. The schools served by these principals varied from early childhood through high school, with the largest percentage (40%) serving students at the elementary level. Please see Table 1 for a detailed description of the study sample of 328 principals.
### Table 1

**Study Sample Demographics**

#### Participant Characteristics

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
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#### Degree

<table>
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<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
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<td>Masters</td>
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<td>63.7</td>
<td>102</td>
<td>64.6</td>
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<tr>
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<tr>
<td>Doctorate</td>
<td>49</td>
<td>14.9</td>
<td>19</td>
<td>12.0</td>
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#### Level of School Served

<table>
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<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
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</thead>
<tbody>
<tr>
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<td>10</td>
<td>3.0</td>
<td>1</td>
<td>.6</td>
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<tr>
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<td>40</td>
<td>12.2</td>
<td>17</td>
<td>10.8</td>
</tr>
<tr>
<td>Early Childhood and Pre-K, Elementary, Middle School/JR High</td>
<td>15</td>
<td>4.6</td>
<td>5</td>
<td>3.2</td>
</tr>
<tr>
<td>Early Childhood and Pre-K, Elementary, Middle School/JR High, High School</td>
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<td>.9</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>Early Childhood and/or Pre-K, High School</td>
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<td>.3</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>Elementary</td>
<td>131</td>
<td>39.9</td>
<td>49</td>
<td>31.0</td>
</tr>
<tr>
<td>Elementary, Middle School/ Junior High</td>
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<td>2.1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Elementary, Middle School/ Junior High, High School</td>
<td>3</td>
<td>.9</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>High School</td>
<td>48</td>
<td>14.6</td>
<td>37</td>
<td>23.4</td>
</tr>
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<td>Middle School/ Junior High</td>
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<td>Middle School/ Junior High, High School</td>
<td>6</td>
<td>1.8</td>
<td>5</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Research Design

The research design for this study was quantitative and non-experimental. Data from the PSES (Tschannen-Moran & Gareis, 2004), the Principal Technology Leadership Assessment (PTLA; CASTLE, 2009), and demographic information were collected via an online survey.
format. Regressions and correlations were used to identify the relationship between self-reported principal self-efficacy and self-reported principal technology behaviors. Additionally, the relationship among each of the three PSES subscales and overall self-reported principal technology behaviors were studied. The PSES subscales include efficacy for management, efficacy for instructional leadership and efficacy for moral leadership (Tschannen-Moran & Gareis, 2004). The variance attributed to demographic variables were also analyzed, including gender and number of years of experience as a public school principal.

Instrumentation

Principal Sense of Efficacy Scale (PSES)

The PSES measures self-reported principal self-efficacy. Originally based on the Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001), the PSES (Tschannen-Moran & Gareis, 2004) is an 18-item instrument that measures self-reported principal self-efficacy. Each item starts with the following phrasing: “In your current role as principal, to what extent can you…” Each item is answered using a nine-point Likert scale with “1” indicating “none at all”, “3” indicating “very little”, “5” indicating “some degree”, “7” indicating “quite a bit”, and “9” indicating “a great deal” (Tschannen-Moran & Gareis, 2004).

The instrument is made up of three subscales: efficacy for management, efficacy for instructional leadership, and efficacy for moral leadership. Each subscale contains six items. The management scale considers paperwork, prioritizing demands, and forming operational policies. An example of an item in the management subscale is “In your current role as principal, to what extent can you maintain control of your own daily schedule.” The instructional leadership scale
examines one’s belief in his or her ability to impact student learning, motivate teachers, manage change, create the learning environment, and raise student achievement. An example of an item in the instructional leadership subscale is “In your current role as principal, to what extent can you motivate teachers.” Finally, the moral leadership subscale aligns with one’s ability to promote spirit in the school community, advance the school’s public image, and promote the school staff. An example of an item in the moral leadership subscale is “In your current role as principal, to what extent can you handle effectively the discipline of students in your school.”

The sample used in validating the PSES included 544 public school principals from Virginia (Tschannen-Moran & Gareis, 2004). The response rate totaled 28 percent of the 1,925 public school elementary, middle, and high schools statewide. Based on the data gathered from this initial sample, the instrument was reduced from 50 items to 18. Tschannen-Moran and Gareis conducted a factor analysis to consolidate the survey for validity purposes. Criteria for removal included items that loaded on multiple factors, failed to load on any factor above 0.40, or correlated to other factors less than 0.30. The factor loadings for efficacy for management ranged from 0.53 to 0.82, while the factor loadings for efficacy for instructional leadership ranged from 0.45 to 0.82. Finally, the factor loading for the efficacy for moral leadership subscale ranged from 0.42 to 0.78. Construct validity was established by correlating the PSES to a work alienation scale, a teacher trust scale, and a parent and student trust scale. There was a negative correlation between principal self-efficacy and work alienation and a positive correlation between self-efficacy and both trust scales. In this study, gender, socioeconomic status, and years of experience as a principal did not significantly impact principal self-efficacy. White principals reported slightly higher levels of self-efficacy than black principals ($r = 0.47$, $p < 0.05$), and principals with higher levels of self-efficacy reported a greater likelihood of
choosing the principalship as a career again ($r = 0.17, p < 0.01$).

**Principal Technology Leadership Assessment (PTLA)**

The PTLA was developed to measure the construct of school technology leadership (CASTLE, 2009). The PTLA is a result of collaboration between the UCEA Center for the Advanced Study of Technology Leadership in Education in the College of Education and Human Development at the University of Minnesota and the American Institutes for Research (AIR). The PTLA is based on the National Education Technology Standards for Administrators (NETS-A), now known as the International Society for Technology in Education (ISTE) Standards for Administrators. As such, the subscales for the PTLA are 1) leadership and vision; 2) learning and teaching; 3) productivity and professional practice; 4) support, management, and operations; 5) assessment and evaluation; and 6) social, legal, and ethical issues. The instrument contains 35 items. Each item is scored on a 5-point Likert scale (CASTLE, 2009).

In creating the instrument, draft items were independently assigned to one of the subscales by members of the development team. Items were revised until the team collectively agreed on the match between the item and the subscale. The instrument underwent expert review from 10 professionals from the areas of educational technology and educational leadership, seeking feedback on both the connection between the item and the subscale and the independent quality of the item. Following the expert review, the development team revised 26 items, deleted two items, and added four items. A pilot study was conducted with a sample of 74 principals from Alberta, Canada, and the states of Arizona, Illinois, Minnesota, New York, Ohio, and Texas.

An analysis showed the PTLA’s internal reliability to be high, with a Cronbach’s alpha of
0.95. Five of the subscales had a Cronbach’s alpha ranging from 0.81 to 0.88; Productivity and Professional Practice, however, showed lower reliability with a Cronbach’s alpha of 0.65. The reliability of the instrument as a whole was higher than any of the subscales, as it was based on more total items (CASTLE, 2009). CASTLE noted that raising each subscale above seven items would increase confidence in exploring subscales independently of the whole instrument.

The directions for taking the PTLA are very specific and include definitions for technology, technology planning, research-based, and assessment. These terms are included Chapter 1 and Appendix B of this study. The terms, as defined in the directions, are consistent with the use of the terms throughout this study. The directions also explain leniency error, halo error, and recency error to help the respondent avoid errors in his or her responses. Leniency error refers to overrating oneself. Halo error refers to rating oneself based on an overall impression rather than on how one performs or behaved accurately within each element. Recency error refers to assessing oneself based on the most recent activity rather than an entire time period. For example, a respondent to the PTLA should consider behaviors over the past year. The directions also stress the importance of being candid in response to the survey items. The original directions from the PTLA and the PSES were used in this study.

Demographics

Demographic information was collected as part of the survey. The first question asked if the respondent is an Illinois public school principal; a response of “no” excluded the respondent from participation in the study. Additional demographic information was collected as follows:

- Number of years of experience as a public school principal
- Number of years of experience as a certified employee (e.g., classroom teacher, administrator) in K-12 public education
- Highest academic degree received
- Gender
- Level of school in which the respondent was employed (e.g., early childhood, elementary, junior high/middle school, high school)
- School’s student enrollment
- Percentage of students in the school qualifying for free and reduced lunch
- Type of school district (urban, rural, suburban)

In addition to providing data for this study’s research questions, the demographic variables also ensured the population met the criteria of currently serving as a public school principal in the State of Illinois.

Study Procedures

This study was determined to be exempt by Northern Illinois University’s Institutional Review Board (IRB) on January 9, 2015 (see Appendix G). Data were collected from current Illinois public school principals, as previously referenced in the sample section of Chapter 3. These data included demographic information, the PSES (Tschannen-Moran & Gareis, 2004) and the PTLA (CASTLE, 2009). Permission was secured to use the PSES and the PTLA (see Appendices E and F). After the demographic data and scales were inserted into a Google form (Appendix B), the resulting form was tested by the researcher and the candidate’s dissertation committee methodology expert to ensure proper functioning and identify potential areas of concern.
An email of the introduction containing the consent information (see Appendix A) and a link to the survey was emailed to all current Illinois public school principals (see Appendix C); a waiver of a signed informed consent document was requested from the IRB due to the anonymous data collection and minimal risks to subjects. A reminder was sent to principals via email one week into the data collection phase of the study (see Appendix D), and the same survey link and invitation was also posted on the message board for the Illinois Principals Association. Initial demographic questions were asked to ensure the principals being surveyed were current Illinois public school principals; other respondents were excluded from the survey. The initial invitation and reminders were sent in two groups each from two different Gmail accounts belonging to the researcher. The staggered invitations and use of two accounts was implemented due to daily email limits established by Google. Such limits set a maximum number of email that can be sent from a given account within a 24-hour period.

Data collection began immediately as survey responses were collected in Google forms. The data were stored in the researcher’s existing Google Drive. The researcher established this account and only the researcher has the account password. Further, settings were reviewed to ensure respondent IP addresses were not collected. At the conclusion of the data collection window, the data were exported from Google forms into Excel on the researcher’s private drive. Both the drive and the file itself are both password protected. The online data file in Google forms was deleted. Finally, the data were uploaded to the Statistical Package for the Social Sciences (SPSS) for analysis.
CHAPTER 4
RESULTS

This study examined the relationships between principal self-efficacy and principal technology behaviors. The experimental design was non-experimental and quantitative, using the PSES (Tschannen-Moran & Gareis, 2004) to measure the self-efficacy construct and the PTLA (CASTLE, 2009) to measure principal technology behaviors. Data were examined in response to the following research questions and responding to hypotheses set forth in Chapter 2.

Preliminary Analyses

Prior to examining the formal research questions, preliminary descriptive statistics were run as detailed in Table 2. Correlations were also run between the main study variables as detailed in Table 3. The study’s independent variables included principal self-efficacy, self-efficacy for management, self-efficacy for instructional leadership, self-efficacy for moral leadership, years of experience as a principal and total years of experience in public education. Technology behavior was the dependent variable. In the exploratory analyses, subsections of technology behaviors were also considered as dependent variables including: 1) Leadership and Vision; 2) Learning and Teaching; 3) Support, Management, and Operations; 4) Assessment and Evaluation; and 5) Social, Legal, and Ethical issues. Productivity and Professional practice, while considered a PTLA subscale (CASTLE, 2009), did not have sufficient reliability ($\alpha= 0.65$) to be considered independently.
## Table 2

### Descriptive Statistics

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<th>Gender</th>
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<th>Min</th>
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<th>Mean</th>
<th>Standard Deviation</th>
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</thead>
<tbody>
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<tr>
<td>Male</td>
<td>Total Number of Years Working in Any Role in Public Education</td>
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<td>41</td>
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<tr>
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### Primary Analyses

#### Research Question 1
What is the relationship between overall principal self-efficacy and self-reported technology behaviors? Are gender, years in the role of principal, and total years of working in education related to self-efficacy and technology behaviors?
Prediction 1

The first prediction was that there will be a significant relationship between overall principal self-efficacy (PSES Total Score) and self-reported technology behaviors (PTLA Total Score). The prediction was supported.

A regression\(^1\) was conducted to explore the role of PSES Total Score in predicting the PTLA Total Score. This regression was significant, \(F(1, 326) = 43.178, p < .01, R^2 = .117\), with the PSES Total Score emerging as a positive, significant predictor, \(\beta = .342\). (see Table 4)

Prediction 2

The second prediction was that significant relationships exist between principal self-efficacy (PSES Total Score) and self-reported technology behaviors (PTLA Total Score) for both males and females. The prediction was supported.

Regressions were conducted to explore the role of PSES Total Score in predicting the PTLA Total Score for each gender. This regression was significant for males, \(F(1, 156) = 25.910, p < .01, R^2 = .157\), with the PSES Total Score emerging as a positive, significant predictor, \(\beta = .377\). The regression was also significant for females, \(F(1, 161) = 13.749, p < .01, R^2 = .079\), with the PSES Total Score emerging as a positive, significant predictor, \(\beta = .182\). See Table 4 for specific regression results.

\(^1\) Regression analyses were used in this study instead of correlations, as regression equations allow one to predict the impact of the independent variable on the dependent variable rather than examine the existence of a relationship.
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Table 3

Pearson Correlation Matrix among Variables
Table 4

Regression Results – Overall Self-Efficacy and Technology Behavior

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<th>Independent Variable</th>
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<th>SE B</th>
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<td>PSES Total Score</td>
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<td>.035</td>
<td>.342</td>
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<td>PSES Total Score</td>
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<td>.049</td>
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<td>.079**</td>
</tr>
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</table>

**P < .01

Prediction 3

The third prediction is self-efficacy (PSES Total Score), years as a public school principal (Total Number of Years Employed as a Public School Principal), and years of experience in any public education role (Total Number of Years Working in Any Role in Public Education) together will significantly predict technology behaviors. The prediction was supported.

A regression was run using the PSES Total Score, Total Number of Years Employed as a Public School Principal, and the individual’s Total Number of Years Working in Any Role in Public Education as independent variables to determine the combined effects of those variables. Again, the PTLA Total Score served as the dependent variable. The PSES Total score, Total Number of Years Employed as a Public School Principal and Total Number of Years Working in Any Role were significantly related to the PTLA Total Score, \( F(3, 321) = 16.169, p < .01, R^2 = .131 \). See Table 5 for specific regression results. Each of the three independent variables was found to be a unique predictor of technology behavior. Total Number of Years Employed as a Public School Principal was negatively related to the PTLA Total Score, (\( β = -.149, p < .05 \),
while the PSES Total Score ($\beta = .337$, $p < .01$) and the Total Number of Years Working in Any Role In Public Education ($\beta = .181$, $p < .05$) were positively and significantly related to the PTLA Total Score.

Table 5
Regression Results- Total Years Employed as a Public School Principal, Total Years Employed in any Role in Public Education, PSES Total Score & PTLA Total Score

<table>
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<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
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<td>Total Number of Years Working in Any Role in Public Education</td>
<td>.016</td>
<td>.006</td>
<td>.181**</td>
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<td>PSES Total Score</td>
<td>.225</td>
<td>.035</td>
<td>.337*</td>
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</table>

*p < .05, two-tailed, **p < .01, two-tailed

Follow-Up to Research Question 1
Are years in the role of principal (Total Years Employed as a Public School Principal) and total years working in education (Total Number of Years Working in Any Role in Public Education) related to self-efficacy (PSES Total Score) and technology behaviors (PTLA Total Score) for both males and females?

As a follow-up to the pre-planned research questions and predictions, the sample was split by gender, and analyses were run again to determine if the three independent variables together significantly predicted technology behaviors for each gender. For males, the regression analysis was significant using the PSES Total Score, Total Number of Years Employed as a Public School Principal, and Total Number of Years Working in Any Role In Public Education as the independent variables, $F (3, 154) = 9.543, p < .01, R^2 = .157$. The PSES Total Score emerged as a unique predictor ($\beta = .374$, $p < .01$). For females, the regression results were also
significant, $F (3, 157) = 7.111, p < .01, R^2 = .120$. Each of the three independent variables was found to be unique predictors of technology behaviors. For females, Total Number of Years Employed as a Public School Principal had a significant, negative relationship with the PTLA Total Score ($\beta = -.275, p < .01$). The PSES Total Score ($\beta = .278, p < .01$) and the Total Number of Years Working in Any Role in Public Education ($\beta = .239, p < .05$) were also both significantly and positively related to the PTLA Total Score. See Table 6 for specific regression results.

**Research Question 2**
What is the relationship between a school principal’s self-reported efficacy for management and self-reported technology behaviors?

**Prediction 4**

Prediction 4 stated that there will be a significant relationship between principals’ self-reported efficacy for management (PSES Efficacy for Management Subscale score) and self-reported technology behaviors (PTLA Total Score). The prediction was supported.

A regression was conducted to explore the role of PSES Efficacy for the Management Subscale score in predicting the PTLA Total Score. This regression was significant, $F (1, 326) = 27.827, p < .01, R^2 = .079$, with the PSES Efficacy for Management emerging as a positive, significant predictor, $\beta = .280$. See Table 7 for specific regression results.
Table 6
Regression Results - Total Years Employed as a Public School Principal, Total Years Employed in any Role in Public Education, PSES Total Score & PTLA Total Score by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
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<td>.049</td>
<td>.278**</td>
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*p < .05, two –tailed, **p < .01, two-tailed

Research Question 3
What is the relationship between a school principal’s self-reported efficacy for instructional leadership and self-reported technology behaviors?

Prediction 5
Prediction 5 stated that there would be a significant relationship between a school
principal’s self-reported efficacy for instructional leadership (PSES Instructional Leadership Subscale score) and self-reported technology behaviors (PTLA Total Score). The prediction was supported.

A regression was conducted to explore the role of PSES Efficacy for the Instructional Leadership Subscale score in predicting the PTLA Total Score. This regression was significant, \( F(1, 326) = 37.275, p < .01, R^2 = .103 \), with the PSES Efficacy for Instructional Leadership emerging as a positive, significant predictor, \( \beta = .320 \). See Table 8 for specific regression results.

Table 7
Regression Results – Efficacy for Management & Technology Behaviors

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<th>SEB</th>
<th>( \beta )</th>
<th>( R^2 )</th>
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<tbody>
<tr>
<td>PTLA Total Score</td>
<td>PSES Efficacy for Management Subscale</td>
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<td>.079**</td>
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</table>

**P < .01

Table 8
Regression Results- Efficacy for Instructional Leadership & Technology Behaviors

<table>
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<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
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<th>( R^2 )</th>
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<td>.103**</td>
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**P < .01
Research Question 4
What is the relationship between a school principal’s self-reported efficacy for moral leadership and self-reported technology behaviors?

Prediction 6

Prediction 6 stated that the principals' self-reported efficacy for moral leadership (PSES Efficacy for Moral Leadership Subscale score) will not be related to their self-reported technology behaviors (PTLA Total Score). The prediction was not supported.

A regression was conducted to explore the role of PSES Efficacy for Moral Leadership Subscale score in predicting the PTLA Total Score. This regression was significant, $F(1, 326) = 27.405, p < .01, R^2 = .078$, with the PSES Efficacy for Moral Leadership emerging as a positive, significant predictor, $\beta = .278$. See Table 9 for specific regression results.

Exploratory Analyses
What are the relationships among different areas of principal self-efficacy and technology behaviors?

Exploratory analyses were conducted to examine the relationships among the PSES subscales (Tschannen-Moran & Gareis, 2004) and the PTLA subscales (CASTLE, 2009). The
PTLA Productivity and Professional Practice subscale was excluded due to low reliability (α = .65), as noted by Tschannen-Moran and Gareis (2004) and confirmed within this study sample (α = .572). These analyses were conducted using simultaneous multiple regressions. In the simultaneous multiple regressions, the PSES Efficacy for Management Score, the PSES Efficacy for Instructional Leadership Score, the PSES Efficacy for Moral Leadership Score, the Total Number of Years Employed as a Public School Principal and the Total Number of Years Working in Any Role In Public Education were the independent variables. The dependent variables were 1) PTLA Leadership and Vision; 2) PTLA Learning and Teaching; 3) PTLA Support, Management, and Operations; 4) PTLA Assessment and Evaluation; and 5) PTLA Social, Legal, and Ethical issues in each analysis, respectively. For PTLA Leadership and Vision, the Total Number of Years Working in Any Role in Public Education (β = .226, p < .01) and PSES Efficacy for Instructional Leadership Score (β = .181, p < .05) were significant, positive individual predictors. The PSES Efficacy for Instructional Leadership Score was a significant, positive unique predictor of PTLA Learning and Teaching (β = .200, p < .01). The Total Number of Years Working in Any Role in Public Education (β = .018, p < .05) and PSES Efficacy for Management Score (β = .092, p < .05) were significant, positive unique predictors of PTLA Support, Management and Operations. The PSES Efficacy for the Management Score (β = .098, p < .05) and PSES Efficacy for the Instructional Leadership Score (β = .188, p < .01) were both significant, positive unique predictors of Assessment and Evaluation. Finally, the Total Number of Years Working in Any Role in Public Education (β = .020, p < .05) was a significant, positive unique predictor of PTLA Social, Legal and Ethical issues. See Table 10 for specific regression results.
Table 10
Regression Results- PSES Subscales & PTLA Subscales

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<th>SEB</th>
<th>β</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTLA Social, Legal &amp; Ethical Issues</td>
<td>Total Years Employed as a Public School Principal</td>
<td>-.006</td>
<td>.010</td>
<td>-.046</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total number of years working in any role in public education</td>
<td>.020</td>
<td>.008</td>
<td>.178*</td>
<td>.096**</td>
</tr>
<tr>
<td></td>
<td>PSES Efficacy for Management</td>
<td>.033</td>
<td>.040</td>
<td>.055</td>
<td></td>
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<tr>
<td></td>
<td>PSES Efficacy for Instructional Leadership</td>
<td>.093</td>
<td>.064</td>
<td>.120</td>
<td></td>
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<tr>
<td></td>
<td>PSES Efficacy for Moral Leadership</td>
<td>.099</td>
<td>.062</td>
<td>.126</td>
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*p < .05, two-tailed, **p < .01, two-tailed
Strong leadership is a critical ingredient for successful 21st Century schools where technology, pedagogy, and change have the power to come together to further student learning (Fullan, 2013). At the federal level, the United States Department of Education Office of Educational Technology’s National Education Technology Plan (NETP) and the Future Ready Schools initiative have heightened aspirations for both student academic growth and teacher classroom accountability. These expectations embrace and anticipate expanded use of digital teaching and learning practices. President Obama has supported these goals through ConnectEd’s initiative designed to afford 99% of students’ access to broadband and the accompanying opportunities for digital learning. The Future Ready Schools initiative supports school districts in enhancing digital learning opportunities. By taking the Future Ready Schools pledge, school leaders are able to set a vision for digital learning and extend public conversation of this goal.

This national effort believes collaborative learning is a requisite for preparing teachers and leaders to effectively educate students for the 21st Century. Therefore, it is assumed teams of educators will convene and engage in connected learning (Transforming American Education, 2010).

This study examined the relationship between public school principal self-efficacy and principal technology behaviors. Specifically the study asked if a discernable relationship exists between principal self-efficacy and principal technology behaviors. A significant relationship
was identified between principal self-efficacy and technology behaviors. This significant relationship was found when examining both overall self-efficacy and the efficacy subscales for management, instructional leadership and efficacy for moral leadership. The relationship between the two main constructs was also significant when the sample was split by gender. Further, overall self-efficacy, number of years of experience as a public school principal and the number of years in any role in public education together yielded a significant relationship among technology behaviors. The number of years of experience as a public school principal was inversely related to technology behaviors, while the other relationships were positive. While this was also true when the analysis was run separately for males and females, different unique predictors emerged as outlined in this chapter. Finally, exploratory analyses also yielded significant relationships among sub-sections of self-efficacy, experience variables, and technology.

Summary of Findings

This study looked for a relationship between principal self-efficacy and principal technology behaviors. Other variables considered included gender, the number of years of experience as a public school principals and the number of years of experience in any role in public education. Data analyses in this quantitative study included descriptive statistics, linear regressions and simultaneous multiple regressions. The self-efficacy construct was measured using the Principal Sense of Efficacy Scale (PSES; Tschannen-Moran & Gareis, 2004), and technology behaviors were self-reported through the Principal Technology Leadership Assessment (PTLA; CASTLE, 2009). Electronic requests were sent to approximately 3,400 Illinois public school principals. Three hundred twenty-eight (328) principals voluntarily elected
to participate in the study, completed PSES and PTLA surveys, and also provided demographic information.

The first research question examined principal self-efficacy and technology behaviors. It was predicted that a significant relationship would be found between these two variables. This hypothesis was supported. It was also hypothesized both genders would have a significant relationship. The initial analysis was repeated after the sample was split by gender. The relationship between self-efficacy and technology behaviors was significant for both genders. This affirmed the hypothesis that gender did not differentially impact the relationship between self-efficacy and technology behaviors. Further, the use of regression analysis as opposed to correlation analysis throughout this study speaks to the weight of a relationship rather than the simple existence of a relationship. For example, in the regression equation for the overall self-efficacy and the overall technology scores, the $\beta$ of .342 tells us that for every unit a principal moves on the PSES, he or she moves .342 units in the same direction on the PTLA.

The third component within this research question examined whether self-efficacy, the number of years of experience as a public school principal and the total number of years of experience in any role within public education together had a significant relationship with self-efficacy. The hypothesis was supported, as significant relationships emerged. The number of years of experience as principal had an inverse relationship with technology behaviors, meaning lower levels of technology behaviors were related to a higher number of years of experience as a principal.

As a follow-up to the initial question and hypothesis, the sample was split by gender and the analysis was repeated for males and for females. Again, significant relationships emerged, but the unique predictors differed for each gender. For males, higher levels of self-efficacy were
related to lower levels of technology behaviors. Self-efficacy was the only significant individual predictor for males. For females, self-efficacy and the two experience variables were all significant. As the number of years of experience as a principal increased, technology behaviors decreased. Higher levels of both self-efficacy and number of years of experience in any role in public education were related to higher instances of technology behaviors.

The second research question examined the relationship between management efficacy and technology behaviors. Efficacy for management is a subscale of the PSES (Tschannen-Moran & Gareis, 2004). The overall score of the PLTA (CASTLE, 2009) was used to measure technology behaviors. It was hypothesized there would be a significant relationship between those variables. This hypothesis was supported as a significant relationship emerged. The relationship was positive, meaning higher levels of efficacy for management were related to higher instances of technology behaviors.

The third research question examined the relationship between efficacy for instructional leadership and technology behaviors. Efficacy for instructional leadership is a subscale of the PSES (Tschannen-Moran & Gareis, 2004). The overall score of the PLTA (CASTLE, 2009) was used to measure technology behaviors. It was hypothesized a significant relationship between those variables would be found. This hypothesis was supported as a significant relationship emerged. The relationship was positive, meaning higher levels of efficacy for instructional leadership were related to higher instances of technology behaviors.

The fourth research question examined the relationship between efficacy for moral leadership and technology behaviors. Efficacy for moral leadership is a subscale of the PSES (Tschannen-Moran & Gareis, 2004). The overall score of the PLTA (CASTLE, 2009) was used to measure technology behaviors. It was hypothesized that no relationship would emerge
between these variables. This hypothesis was not supported, as a significant relationship did emerge between efficacy for moral leadership and reported technology behaviors.

Exploratory analyses examined relationship between subscales of self-efficacy and subscales of technology behaviors. Productivity and professional practice, a subscale of the PTLA (CASTLE, 2009), was excluded from the exploratory analyses. This exclusionary decision aligned with recommendations provided by the researchers who created the instrument and was confirmed by this study. Number of years working in any role public education, number of years employed as a public school principal, efficacy for management, efficacy for instructional leadership and efficacy for moral leadership were the independent variables. The dependent variables were 1) leadership and vision; 2) learning and teaching; 3) support, management, and operations; 4) assessment and evaluation; and 5) social, legal, and ethical issues in each analysis, respectively. The number of years working in public education and efficacy for instructional leadership were unique predictors of leadership and vision. Efficacy for instructional leadership was a significant unique predictor of technology learning and teaching. The number of years working in public education in any role and efficacy for management were significant unique predictors of technology support, management, and operations. Efficacy for management and efficacy for instructional leadership were both significant unique predictors of technology assessment and evaluation. Finally, the number of years working in public education in any role was a significant unique predictor of in the area of social, legal, and ethical issues. The number of years working in public education was a unique predictor of three dependent variables. The number of years working in public schools and efficacy for instructional leadership each emerged as unique predictors of three of the dependent variables, while efficacy for management was a unique predictor for two of the dependent variables. The number of years employed as a
public school principal and efficacy for moral leadership did not emerge as unique predictors for any of the dependent variables.

Discussion

This study responded to the need for more research on 21st Century school principal behaviors, particularly the relationship between self-efficacy and technology behaviors. Self-efficacy refers to one’s belief that he or she can positively impact a situation. Is this belief in oneself related to enhanced technology leadership? Five of the study’s six hypotheses were supported, suggesting relationships do exist between public school principals’ levels of self-efficacy and technology behaviors. This outcome, coupled with findings from a follow-up and exploratory analyses, prompts further examination.

A significant relationship between overall self-efficacy and technology behaviors was found; likewise, a significant relationship with technology behaviors emerged when self-efficacy was disaggregated into the specific areas of management, instructional leadership and moral leadership. Further, the relationships among aspects of self-efficacy and aspects of technology behaviors indicate self-efficacy is indeed a factor when considering public school technology leadership.

The impact of gender was examined within the first research question. Note the sample itself was balanced according to gender, with 158 males and 163 females participating; seven participants did not indicate gender. A significant relationship between self-efficacy and technology behaviors was found for both males and females. This finding aligned with previous literature discussing the relationship between self-efficacy and gender (Leithwood & Jantzi,
When self-efficacy, the number of years of principal experience, and the total number of years education experience were considered together, significant relationships again emerged for both genders. The unique predictors, however, differed. Males with higher levels of self-efficacy showed lower levels of technology behaviors. Conversely, females with higher self-efficacy reported higher technology behaviors. Further, an increased number of years as a principal suggested a negative relationship with technology behaviors. However, a higher total years of experience in public schools yielded a positive relationship to technology behaviors. Both experience predictors followed the trends for the overall sample. These gender intricacies are mirrored in the literature as well. Banoglu (2011) found women were more likely to engage in behaviors within the Teaching and Learning and Leadership and Vision subscales of a PTLA translation than their male counterparts. Females were also identified as being more collaborative. Neither general nor principal experience was consistently predictive of technology behaviors in the literature (Banoglu, 2011; Leithwood & Jantzi, 2008; Papaioannou & Charalambous, 2011; Tschannen-Moran and Gareis, 2004). In this study, the total number of years of experience in any educational role had a significant positive relationship with technology behaviors. However, the total number of years of experience as a principal had an inverse relationship with technology behaviors. While this finding may seem counterintuitive, Dexter and Anderson (2005) suggest principals may be slower to change their own behaviors than to lead others in modifying their behavior. Principals may also shift focus to providing professional learning opportunities for others and actively engage in less professional development to enhance their own skill sets. Further research on why some technology behaviors are embraced while others are abandoned may lead to more insight. The PTLA (CASTLE, 2009)
did not address the reasons behind the behaviors, which is discussed in the limitations section below.

It is also possible disaggregating the experience variable to identify principals who may have been employed in a non-education career and the nature of a principal’s years in a non-leadership educational experiences could yield greater understanding of the impact of the experience variable. Different occupations may have involved a different level of technology use or a different degree of specialized training. For example, a principal who worked in marketing research prior to education may have had extensive experience using spreadsheets. Other careers, however, may not have had a similar impact. It could be that principals who served in an education role other than as a classroom teacher may have also had varying degrees of training, experience and skills using technology. For example, a school psychologist who coordinated Individualized Education Plans within an online platform may naturally engage in more technology behaviors than a classroom teacher who had less occasion to navigate such systems.

Limitations

The current study may limit the degree to which the results may be generalized. Counterbalancing, sample size, a state specific sample, the use of self-reported data and a structural element of the PTLA (CASTLE, 2009) were identified as limitations. Counterbalancing the instrument was a limitation of this study. A counterbalancing feature was not available in Google Forms. As a result all participants received an identical sequence of instrumentation that moved through demographic questions, the PSES (Tschannen-Moran & Gareis, 2004) and the PTLA (CASTLE, 2009), respectively. The PSES was placed first as it addressed the study’s independent variable and theoretical construct. As the PSES aligns with
principal leadership efficacy, there was a greater likelihood respondents would be familiar with items on this scale.

Sample size was also a limitation of this study. As previously noted, the sample included 328 participants out of a possible 3,400 Illinois public school principals. Email filters or changes in assignment resulted in some surveys being undeliverable. Emails to a majority of the Chicago Public School principals were returned as undeliverable, along with those to smaller school districts throughout Illinois. In other instances, principals stated they either did not have time to participate or did not respond at all. Further, this sample was drawn specifically from Illinois. An identical study in a different state may yield different results, as public education is primarily deemed a state and local responsibility with differences in funding formulas and per student spending.

The use of self-reported data is also a limitation of this study. The PTLA (CASTLE, 2009) directions expressly cautioned potential study participants about leniency, halo, and recency errors, as discussed in the instrumentation section. Social desirability is another risk with self-reported data. A desire to give the preferred response could cause a principal to report higher engagement in technology behaviors than is accurate. Further, a principal who dislikes or believes he or she has minimal skill in technology may dismiss the survey at its onset believing he or she has nothing to add.

The PTLA (CASTLE, 2009) structure is another limitation. The PTLA captures one year of self-reported technology behavior, but it does not discern why the behavior either does or does not occur. For example, a principal might not “assess and evaluate existing technology-based administrative and operations systems for modification or upgrade,” as stated on Question 3 of the PTLA Assessment and Evaluation Subscale. Knowing more about the respondent’s
underlying reasoning could help identify the difference between skills, preferences, and structures influencing the principal’s behavior. Skills reference one’s ability to do something. In that case, a principal may not explore the operations systems referenced above because he or she has difficulty accessing or navigating such systems. Preference indicates choice. With that, a principal may prefer to keep paper files. Structures refer to the larger organization. In this example, a district level administrator may have oversight and decision making power for administrative and operations systems; the principal may not be part of this process. Preference and structures do not necessarily align with skill.

Low R-squared values are also limitations within the study. While some regressions with R-squared = .000 are significant in this study, a low R-squared value suggests that the independent variable is not responsible for any of the variance of the dependent variable. While the significance of the regression is still present, another variable may prove to be a better fit.

Recommendations

Relationships found in this study have the potential to inform the identification and development of school principals, highlight the importance of building efficacy in leaders, and stress the importance of feeding the principal’s learner mindset. The alignment of the PSES (Tschannen-Moran & Gareis, 2004) with the ISLLC standards strengthens the connection between self-efficacy and leadership needs. When recruiting and selecting candidates for principal positions, it is sometimes challenging to find candidates who meet the myriad of demands placed on this leadership role. Even in an age of technology, technology skills alone are not enough. Self-efficacy, however, is a general construct that has the power to permeate multiple areas. As the literature suggests, high self-efficacy helps leaders persist in times of
challenge and change (Wood & Bandura, 1989). Regression results support the direction and strength of the relationship between self-efficacy and technology behaviors. Current building and district leaders should reach out to informal leaders who demonstrate high levels of self-efficacy and high frequency of technology behaviors across the school setting. This group constitutes the future principal pool for our 21st Century schools.

As Bandura (1977) noted, strategies for developing leader self-efficacy include guided mastery, cognitive mastery, and self-regulatory competences. Principals must be connected with experiences designed to enhance their individual self-efficacy levels. While this is true of new principals, it is also true for experienced principals as the demands placed upon principals continue to grow and change. Studying how the experience variables and self-efficacy together impact technology behaviors is useful as district leaders examine their current school principals. Self-efficacy can perpetuate the agility leaders need to impact a learning environment and guide it in becoming Future Ready. Principal candidates with high levels of self-efficacy have the power to model technology behaviors that may ultimately impact teaching, learning and technology integration in classrooms.

Differences in the gender predictors suggest differentiating leaders’ learning opportunities may facilitate meeting principals’ self-efficacy needs. It would be important to investigate why male principals with high efficacy tend to have low technology behaviors so appropriate supports can be put into place. With females, it would be important to build self-efficacy, as this leads to increased engagement in technology behaviors.

Meeting self-efficacy needs also includes perpetuating the leaders’ learner mindsets, both within the formal principal role and as well as within other educational leadership roles. Viewing oneself as a learner is important to success in the contemporary world (Fullan, 2013). Support
from superintendents and other stakeholder groups is among the antecedents to principal self-efficacy (Leithwood & Jantzi, 2008) that should be strategically leveraged to propel building principals forward. As such it is not enough to give principals oversight and responsibility for others’ learning. If we want teachers to model life-long learning for students, principals must model this trait for teachers. Likewise, an environment wherein learning, taking risks, failing and trying again must pervade all levels of an effective learning organization. These recommendations align with Future Ready’s emphasis on both training and ongoing development and with previous studies connecting this emphasis to the importance of learning (Hadjithoma-Garstka, 2000; Mayring, 2000; Papaioannou & Charalambous, 2011).

Future Research

This study yielded important information regarding the relationship between school principal self-efficacy and principal technology behaviors. The study also framed areas meriting further study. These areas include developing an education technology efficacy scale, studying the collective efficacy of building or school district leadership teams, expanding the research design to include either principal interviews or pairing teacher-reported data about their principal with the principal’s self-reported data and considering other variables that may relate more closely to self-efficacy. As noted in Chapter 2, while scales exploring technology efficacy exist, due to the ever-changing nature of technology, these scales often quickly become outdated. Designing a technology self-efficacy scale would afford researchers the ability to determine if principals showing high levels of self-efficacy on a leadership scale mirror similar levels of self-efficacy on a technology specific scale designed for educators.

Looking beyond the role of the principal to the collective efficacy of a school leadership
team is another area for future research. The Future Ready programming from the Office of Educational Technology calls for schools to develop teams. Examining the composition and the collective efficacy of such teams may produce further details on what should be replicated or avoided as other school districts and school sites move forward.

Expanding the current study’s design could also yield additional information. As acknowledged in the limitations section, the PTLA (CASTLE, 2009) does not address why principals do or do not engage in specific behaviors. Pairing the PTLA with principal interviews could yield data to address this weakness in the study. Further, adding another data point, such as teachers’ perceptions of his or her principal, could strengthen the self-reported data.

Looking back to Bandura’s (1996, 1997) reciprocal causation, behavior is one element of self-efficacy. While this study found a significant relationship between self-efficacy and technology behaviors, Beta weights were frequently low. This indicates that other variables may be more closely relate with technology behaviors. Examining personal and environmental variables, the other two considerations in triadic reciprocal causation, is an area for future study. Personal variables are internal, such as one’s preferences. Environmental variables are external, like the structure of the organization in which someone leads.

Conclusion

This study examined the relationship between principal self-efficacy and principal technology behaviors. Gender, the number of years employed as a public school principal, and the aggregate number of years in public education in any role were also considered in tandem with self-efficacy in some analyses. The results indicated a significant relationship between principal self-efficacy and principal technology behaviors. This was true of overall self-efficacy
and also the three subscales of management, instructional leadership, and moral leadership. When considered together, overall self-efficacy, the number of years in any role in public education, and the number of years of experience as a principal were all individual predictors of technology behaviors. While there was a positive relationship between both overall self-efficacy and the number of years of experience in any role in public education with technology behaviors, there was an inverse relationship between the number of years of experience as a principal and technology behaviors. Therefore, the current study found that as the number of years of principal experience increased, technology behaviors decreased. There was also a significant relationship between overall self-efficacy and technology behaviors with both males and females when the sample was divided by gender. However, individual predictors differed. Exploratory studies using the subscales within both self-efficacy and technology behaviors also yielded significant relationships with differing individual predictors. All in all, the significant relationship between principal self-efficacy and principal technology behaviors has the potential to inform the identification and development of 21st Century school leaders and provide a foundation for further research.
REFERENCES


You are invited to complete survey questions for research about school principal self-efficacy and technology behaviors being conducted by Kathleen Melton, doctoral student at Northern Illinois University. The purpose of the study is to examine principal beliefs and technology behaviors. If you agree to participate in this study, you will be asked to complete an on-line survey that will take approximately 25 minutes to complete.

All information gathered during this study is anonymous. The information gathered will be used for the purposes of completing a doctoral dissertation and may be presented in the future at scientific meetings or published in scientific journals. No school participant names or school district names will be collected.

If you choose to participate, please know participation is voluntary and may be withdrawn at any time without penalty or prejudice. If you have any additional questions concerning this study, contact the Chair of this dissertation research, Dr. Jon Crawford, Associate Professor at Northern Illinois University in the Department of Leadership, Educational Psychology, and Foundations at (815) 753-7248.

If you would like further information regarding your rights as a research participant, contact the Office of Research Compliance at Northern Illinois University at (815) 753-8588.

If I choose to participate....

I understand that the intended benefits of this study include increasing the body of scholarly work and understanding in the area of teacher performance evaluation as related to teacher beliefs.

I have been informed that potential risks and/or discomforts you could experience during this study are minimal. My anonymous responses will be closely managed by the researcher.

I understand that my consent to participate in this project does not constitute a waiver of any legal rights or redress I might have as a result of my participation, and I acknowledge that you have received a copy of this consent form. (Please print this page if you would like a hard copy).

Thank you,
Kathleen Melton
Doctoral Student
Northern Illinois University
mail.kathyamelton@gmail.com
Principal Self-Efficacy and Technology Behaviors

Informed Consent for Participation in Study

You are invited to complete survey questions for research about school principal self-efficacy and technology behaviors being conducted by Kathleen Melton, doctoral student at Northern Illinois University. The purpose of the study is to examine principal beliefs and technology behaviors. If you agree to participate in this study, you will be asked to complete an on-line survey that will take approximately 25 minutes to complete.

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Thank you,
Kathleen Melton
Doctoral Student
Northern Illinois University
mailto: kathymelton@gmail.com

1. I agree to participate in this study. *
   Mark only one oval.
   □ Yes, I agree.
   □ No, I do not wish to participate. (Please note selecting this option will exit you from the survey). Stop filling out this form.
9. **Level of School**
   Click all levels that are served in your school.
   *Check all that apply.*
   - Early Childhood and/or Pre-K
   - Elementary
   - Middle School/ Junior High
   - High School

10. **Please type in the percentage of your students who are eligible for free and reduced lunch in your school. Type DK if you do not know.**

11. **District Type**
    *Mark only one oval.*
    - Urban
    - Suburban
    - Rural

**Principal Beliefs**
This questionnaire is designed to help us gain a better understanding of the kinds of things that create challenges for principals in their school activities.

Directions: Please indicate your opinion about each of the questions below by marking one of the nine responses in the columns on the right side. The scale of responses ranges from “None at all” (1) to “A Great Deal” (9), with “Some Degree” (5) representing the mid-point between these low and high extremes. You may choose any of the nine possible responses, since each represents a degree on the continuum. Your answers are confidential.

Please respond to each of the questions by considering the combination of your current ability, resources, and opportunity to do each of the following in your present position.
Technology Behaviors

The individual items in the assessment ask you about the extent to which you have engaged 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. Note that leaving multiple items blank may limit the usefulness of the assessment results.

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 principals that you know. Please note that the accuracy and usefulness of this assessment is largely dependent upon your candor. If done with care, the results can provide you with valuable information as you seek to extend or improve your leadership skills.

When assessing behaviors and performance, individuals have a tendency to make several types of errors. You should familiarize yourself with the following errors:

Leniency error. This occurs when an individual gives himself an assessment higher than he deserves. This could occur for several reasons: the individual has relatively low performance standards for himself; the individual assumes that other individuals also inflate their ratings; or, for social or political reasons, the individual judges that it would be better not to give a poor assessment. As you assess yourself, you should understand that accurate feedback will provide you with the best information from which to base further improvement.

Halo error. This occurs when an individual assesses herself based on a general impression of her performance or behavior, and the general impression is allowed to unduly influence all the assessments given. An example of halo error would be an individual who rates herself highly on every single assessment item. It is rare that individuals perform at exactly the same level on every dimension of leadership. It is more likely that an individual performs better in some areas than on others.

Recency error. This occurs when an individual bases an assessment on his most recent behavior, as opposed to his entire behavior over some fixed period of time (e.g., the last year). This assessment should be based on your behavior over the entire year (or other fixed period of time).

The following terms appear throughout the assessment. Keep these definitions in mind as you read the items and make your response.

Technology. Generally refers to personal computers, networking devices and other computing devices (e.g., electronic whiteboards and personal digital assistants (PDAs)); also includes software, digital media, and communications tools such as the Internet, e-mail, CD-ROMs, and video conferencing.

Technology planning. Any process by which multiple stakeholder groups (e.g., district administration, school administration, faculty, and parents) convene to develop a strategy for the use or expanded use of technology in instruction and operations. Technology planning need not be separate from other planning efforts, but should be a recurring theme if integrated within a more comprehensive planning process.

Research-based. A practice that employs systematic, empirical methods that draw on observation or experiment to provide reliable data. Research-based work uses research designs and methods appropriate to the research question posed and are presented in sufficient detail for replication. The strongest research-based practices typically obtain acceptance through peer-reviewed journals or expert panels.

Assessment. A method of measurement used to evaluate progress.
18. To what extent did you engage in activities to identify best practices in the use of technology (e.g. reviews of literature, attendance at relevant conferences, or meetings of professional organizations)?
Mark only one oval.

1 2 3 4 5

Not at all ○ ○ ○ ○ ○ Fully

II. Learning and Teaching

19. To what extent did you provide or make available assistance to teachers to use technology for interpreting and analyzing student assessment data?
Mark only one oval.

1 2 3 4 5

Not at all ○ ○ ○ ○ ○ Fully

20. To what extent did you provide or make available assistance to teachers for using student assessment data to modify instruction?
Mark only one oval.

1 2 3 4 5

Not at all ○ ○ ○ ○ ○ Fully

21. To what extent did you disseminate or model best practices in learning and teaching with technology to faculty and staff?
Mark only one oval.

1 2 3 4 5

Not at all ○ ○ ○ ○ ○ Fully

22. To what extent did you provide support (e.g. release time, budget allowance) to teachers or staff who were attempting to share information about technology practices, issues, and concerns?
Mark only one oval.

1 2 3 4 5

Not at all ○ ○ ○ ○ ○ Fully
23. 5. To what extent did you organize or conduct assessments of staff needs related to professional development on the use of technology?  
Mark only one oval.

1 2 3 4 5
Not at all  ○  ○  ○  ○  ○ Fully

24. 6. To what extent did you facilitate or ensure the delivery of professional development on the use of technology to faculty and staff?  
Mark only one oval.

1 2 3 4 5
Not at all  ○  ○  ○  ○  ○ Fully

III. Productivity and Professional Practice

25. 1. To what extent did you participate in professional development activities meant to improve or expand your use of technology?  
Mark only one oval.

1 2 3 4 5
Not at all  ○  ○  ○  ○  ○ Fully

26. 2. To what extent did you use technology to help complete your day-to-day tasks (e.g., developing budgets, communicating with others, gathering information)?  
Mark only one oval.

1 2 3 4 5
Not at all  ○  ○  ○  ○  ○ Fully

27. 3. To what extent did you use technology-based management systems to access staff/faculty personnel records?  
Mark only one oval.

1 2 3 4 5
Not at all  ○  ○  ○  ○  ○ Fully
28. 4. To what extent did you use technology-based management systems to access student records?  

Mark only one oval.

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<td>5</td>
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Not at all

29. 5. To what extent did you encourage and use technology (e.g., e-mail, blogs, videoconferences) as a means of communicating with education stakeholders, including peers, experts, students, parents/guardians, and the community?  

Mark only one oval.

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IV. Support, Management, & Operations

30. 1. To what extent did you support faculty and staff in connecting to and using district and building-level technology systems for management and operations (e.g., student information systems, electronic grade book, curriculum management systems)?  

Mark only one oval.

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31. 2. To what extent did you allocate campus discretionary funds to help meet the school’s technology needs?  

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32. 3. To what extent did you pursue supplemental funding to help meet the technology needs of your school?  

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33. 4. To what extent did you ensure that hardware and software replacement/upgrades were incorporated into school technology plans?  
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34. 5. To what extent did you advocate at the district level for adequate, timely, and high-quality technology support services?  
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35. 6. To what extent did you investigate how satisfied faculty and staff were with the technology support services provided by your district/school?  
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V. Assessment & Evaluation

36. 1. To what extent did you promote or model technology-based systems to collect student assessment data?  
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37. 2. To what extent did you promote the evaluation of instructional practices, including technology-based practices, to assess their effectiveness?  
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38. 3. To what extent did you assess and evaluate existing technology-based administrative and operations systems for modification or upgrade?  
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39. 4. To what extent did you evaluate the effectiveness of professional development offerings in your school to meet the needs of teachers and their use of technology?  
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40. 5. To what extent did you include the effective use of technology as a criterion for assessing the performance of faculty?  
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VI. Social, Legal, & Ethical Issues

41. 1. To what extent did you work to ensure equity of technology access and use in your school?  
Mark only one oval.

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42. 2. To what extent did you implement policies or programs meant to raise awareness of technology-related social, ethical, and legal issues for staff and students?  
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43. 3. To what extent did you implement policies or programs meant to raise awareness of technology-related social, ethical, and legal issues for staff and students?  
Mark only one oval.

1 2 3 4 5
Not at all 0 0 0 0 0 Fully

44. 4. To what extent were you involved in enforcing policies related to copyright and intellectual property?  
Mark only one oval.

1 2 3 4 5
Not at all 0 0 0 0 0 Fully

45. 5. To what extent did you support the use of technology to help meet the needs of special education students?  
Mark only one oval.

1 2 3 4 5
Not at all 0 0 0 0 0 Fully

46. 6. To what extent did you support the use of technology to assist in the delivery of individualized education programs for all students?  
Mark only one oval.

1 2 3 4 5
Not at all 0 0 0 0 0 Fully

47. 7. To what extent did you disseminate information about health concerns related to technology and computer usage in classrooms and offices?  
Mark only one oval.

1 2 3 4 5
Not at all 0 0 0 0 0 Fully
APPENDIX C

INVITATION TO PARTICIPATE IN THE STUDY
Dear Public School Principals in Illinois,

My name is Kathleen Melton. I currently serve as the principal of Lowell Elementary School in Community Unit School District 200 in Wheaton. I am also a doctoral student in the Educational Administration program at Northern Illinois University. I am writing to ask if you would participate in my dissertation study about principals' technology behaviors.

The role of the principal is complex and ever-changing. Technology leadership is one area of both need and challenge. This study will explore the relationship between public school principal technology behaviors and self-efficacy. Self-efficacy is defined as one’s belief that he or she can reach goals and accomplish tasks. Additionally, this study will take into consideration the impact of demographic variables on that relationship, including gender and years experience in the role of the principal. This study will increase the scholarly knowledge base and provide insight for those responsible for principal identification, preparation and professional development.

Participation in this study is voluntary and will require participants to complete an on-line survey that consists of two measures: the Principal Sense of Efficacy Scale (PSES; Tschannen-Moran & Gareis; 2004) and the Principal Technology Leadership Assessment (PTLA; CASTLE, 2009). The survey should take 25 minutes to complete. You will also be asked to answer basic demographic questions about yourself and your district.

Data for this study will be anonymously collected. You will not be required to give your name or your school name. Settings on this survey are also such that IP addresses will not be collected. Data will be stored confidentially. If you are interested in voluntarily participating in this important study, please click on the following link:

This link will navigate you to the consent document and the on-line survey: https://docs.google.com/forms/d/1LLF9VFZEvVbrp32uiqaqEamL_MmBbxjzFokcEp_e4sc/viewform

If you have any questions about the study please contact Dr. Jon Crawford, Professor at Northern Illinois University and dissertation chair at 815-753-8588 or me at 630-327-0250. Additionally, please understand that if you wish for further information regarding your rights as a research subject, you may contact the Office of Research Compliance at Northern Illinois University at 815-753-8588.

Thank you very much for your participation in this study.

Respectfully,

Kathleen Melton
Doctoral Student
Northern Illinois University
APPENDIX D

REMINDER INVITATION TO PARTICIPATE IN THE STUDY
Dear Public School Principals in Illinois,

Last week each of you received an e-mail from me requesting your voluntary participation in my doctoral study examining principal self-efficacy and technology behaviors. Thank you to those of you who have participated thus far. Knowing the many demands on your time, I greatly appreciate your help in helping me accomplish this personal and professional goal and contributing back to our profession.

As a reminder, you can participate in this survey through voluntary completion of an online survey. This survey will take 20-25 minutes to complete. As also stated earlier, data will be collected anonymously, and you will not be required to share your name or your school name.

This link will navigate you to the consent document and the on-line survey:
https://docs.google.com/forms/d/1LLF9VFZEvVbrp32uiqaqEamL_MmBbxjzFokcEp_e4sc/viewform

If you have any questions about the study please contact Dr. Jon Crawford, Professor at Northern Illinois University and dissertation chair at 815-753-8588 or myself at 630-327-0250. Additionally, if you wish for further information regarding your rights as a research subject, you may contact the Office of Research Compliance at Northern Illinois University at 815-753-8588. Finally, the contents of my original email are copied below. Again, I am grateful for your time and participation in this important study.

Respectfully,

Kathleen Melton
Doctoral Student
Northern Illinois University
APPENDIX E

PERMISSION TO USE THE PRINCIPAL SENSE OF EFFICACY SCALE
July 25, 2014

Kathleen,

You have my permission to use the Principals’ Sense of Efficacy Scale, which I developed with Chris Gareis, in your research. The best citation to use is:


You can find a copy of these measures and scoring directions on my web site at http://wmpeople.wm.edu/site/page/mxtsch. I will also attach directions you can follow to access my password protected web site, where you can find the supporting references for these measures as well as other articles I have written on this and related topics.

I would love to receive a brief summary of your results when you finish.

All the best,

Megan Tschannen-Moran
The College of William and Mary
School of Education
http://wmpeople.wm.edu/site/page/mxtsch
APPENDIX F

PERMISSION TO USE THE PRINCIPALS TECHNOLOGY LEADERSHIP ASSESSMENT
Kathy Melton <mail.kathymelton@gmail.com> 7/24/14

Dr. McLeod,

Greetings! My name is Kathleen Melton, and I currently serve as the principal of Lowell Elementary School in Community Unit School District 200 based in Wheaton, Illinois. I am also a doctoral candidate at Northern Illinois University in the department of Leadership, Educational Psychology, and Foundations. My dissertation chair is Dr. Jon Crawford, and my methodologist is Dr. Lisa Davidson-Becker.

My dissertation will be a quantitative study exploring school principal self-efficacy and school principal engagement in technology behaviors. I plan to survey all Illinois public school principals serving students from Pre-Kindergarten through Grade 12.

I would like to request your permission to use the Principals Technology Leadership Assessment to measure the technology behaviors of school principals. I will be happy to share the findings with you upon conclusion of my study.

Thank you for your consideration and support!

Respectfully,

Kathleen Melton

Scott McLeod <dr.scott.mcleod@gmail.com> 7/24/14

You have our permission. We just ask that you send us (me!) a digital copy of any writings that result from your study, including dissertation, articles, etc. Thanks. Have fun!

SCOTT
APPENDIX G

OFFICE OF RESEARCH COMPLIANCE INSTITUTIONAL REVIEW BOARD APPROVAL
Exempt Determination

09-Jan-2015
Kathleen Melton
Leadership, Educational Psychology and Foundations

RE: Protocol # HS15-0010 "Principal self-efficacy and technology behaviors"

Dear Kathleen Melton,

Your application for institutional review of research involving human subjects was reviewed by Institutional Review Board #2 on 08-Jan-2015 and it was determined that it meets the criteria for exemption, as defined by the U. S. Department of Health and Human Services Regulations for the Protection of Human Subjects, 45 CFR 46.101(b). 

Although this research is exempt, you have responsibilities for the ethical conduct of the research and must comply with the following:

- **Amendments**: You are responsible for reporting any amendments or changes to your research protocol that may affect the determination of exemption and/or the specific category. This may result in your research no longer being eligible for the exemption that has been granted.

- **Record Keeping**: You are responsible for maintaining a copy of all research related records in a secure location, in the event future verification is necessary. At a minimum these documents include: the research protocol, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to participants, all correspondence to or from the IRB, and any other pertinent documents.

Please include the **protocol number (HS15-0010)** on any documents or correspondence sent to the IRB about this study.

If you have questions or need additional information, please contact the Office of Research Compliance and Integrity at 815-753-8588.