A STUDY OF TECHNOLOGY LEADERSHIP AMONG ELEMENTARY PUBLIC SCHOOL PRINCIPALS IN MIAMI-DADE COUNTY

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Abstract

Technology leadership is a strong part of principal leadership, which is essential to the successful technology integration in schools. However, research is limited in the area of principals’ technology leadership and their professional development needs. Therefore, the purpose of this descriptive study is to examine Miami-Dade County elementary public school principals’ self-reported proficiency and perceived importance of technology leadership based on the National Educational Technology Standards for Administrators (NETS-A). Using a descriptive method, the researcher collected quantitative data through the administration of the Educational Technology for Principals Survey. A sample of 103 elementary school principals responded to the survey. The following results were derived from the data analysis of this study:

1. The sample of Miami-Dade elementary school principals identified the Productivity and Professional Practice as the most proficient among the six areas of technology leadership based on the NETS-A and the Assessment and Evaluation and Support, Management, and Operations were the least proficient areas.

2. The sample placed the highest importance in the area of Leadership and Vision with Social, Legal, and Ethical Issues being the second most important area. Similar to their response to self-reported proficiency, samples rated Assessment and Evaluation as the lowest area that they perceived to be important.

3. No significant differences were found in the mean scores of self-reported proficiency in technology leadership among principals with different numbers of technology-related graduate courses and in-service workshops in technology leadership.

4. No significant differences were found in the mean scores for the degree to
which principals valued technology leadership among principals with different numbers of technology-related graduate courses and in-service workshops in technology leadership.

5. Significant professional development needs were found for all six areas of the NETS-A with the area of Leadership and Vision being the highest need area.

The results of the study have significant implications for a variety of audiences, including university preparation programs for educational administrators, state, and school district offices for professional development in educational leadership, and state and school district school administrators’ certification organizations. Implications for future study were also discussed based on the limitations of the study.
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Special thanks to all 103 elementary school principals in Miami-Dade County who willingly participated in completing the survey instrument. Also, special thanks to my pastor, Bishop Wantworth Heron, who never ceased to pray for the endurance during this process.
Dedication

I embark on a journey toward a high intellectual challenge welcoming the beginning of many more challenges that will define my scholarly life. This journey would not have been possible without the divine intervention of God to whom I give honor, thanks, and praises for all the impossible things that he made possible in my life.

This dissertation is dedicated to my daughter, Jody Sheree Spencer (16 years old) and to my son, Tomlinson Oswald Spencer (13 years old), who suffered with me throughout this process. It is a blessing that both of them are independent of me when it comes to doing homework assignments and even cooking simple meals. I thank God for both of them. You two children are tough soldiers who can weather any storm.

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Chapter 1: Introduction

Innovations in technology have altered practically every aspect of life and education has been no exception. In the 21st century, the growth in computer technologies has given rise to the integration of technology in the teaching and learning process (Center for Applied Research in Educational Technology, 2000). Accordingly, technology and information literacy have become an increasingly important requirement in schools today (Center for Applied Research in Educational Technology, 2000; Corporation for Public Broadcasting, 2003; U.S. Department of Education, 2004). The No Child Left Behind (NCLB) Act of 2001 (2002), signed into law by President Bush in January 2002, requires each student to be technologically literate by the eighth grade. Accordingly, students are deemed technologically literate by meeting the National Educational Technology Standards for Students. This national standard to determine literacy identifies critical technology-based abilities and skills that students must acquire to learn effectively and live productively in an increasingly digital world (International Society for Technology in Education [ISTE], 2002).

In order to prepare better today’s generation of students to be effective users of ever-evolving technologies, the U.S. Department of Education (2004) produced the National Education Technology Plan for educational transformation in kindergarten-Grade 12 (K-12) schools. The U.S. Department of Education (2004) laid out a set of action steps to carry out the government’s technology plan. The steps include strengthening leadership through development of tech-savvy leaders at school, school district, and state levels. The goal is to develop leaders who cannot only supervise but also provide informed; creative; and, ultimately, transformative leadership for systemic
change. The action plan also emphasizes the equally important role of teachers in the transformational process. The plan recommends effective and seamless technology integration into teaching and learning processes by improving the preparation of new and in-service teachers in the use of technology.

Despite the government’s efforts to improve education through technology integration, the requirements of NCLB Act of 2001 and the recommendations of the National Education Technology Plan (2004) have become a new and ongoing challenge in schools. Despite the federal government’s bold effort in advocating technology-driven education transformation, its impact on the realities of technology has been limited. Several national and state level studies were conducted on the use of technology in education and the resulting impact on the education process (Bailey, 2004; Mann, Shakshaf, Becker, & Kottkamp, 1999; Wenglinski, 1998). In 2004, the National Center for Education Statistics (NCES; as cited in Education Week, 2005) survey results confirmed that there was one computer for every 3.8 students. In 2003, a study revealed that 93% of public school classrooms had Internet access (NCES, 2005). Despite this substantially high level of access to Internet ready computers, studies demonstrated that most teachers still were not comfortable with integrating technology into their instructional practices (Feldman, 2001; NCES, 2000).

**Barriers to Effective Technology Integration in Schools**

There are many barriers to the successful and effective integration of technology in schools. These barriers include teachers’ attitudes and beliefs toward technology, teachers’ proficiency level with technology, lack of technology-related resources in schools, and lack of institutional vision and informed leadership in technology. Teachers’
attitudes toward technology and beliefs in the instructional benefits about technology present a significant barrier to technology integration. What are the attitudes of teachers? Teachers feel unprepared and unaware of the content-based practices that the Internet has to offer due to inadequate professional development or lack of continuity and follow-up through continuing education programs (Fullan, 2001a). Teachers’ attitudes may also be affected by a lack of incentives for teacher technology use (Gahala, 2001) and a nonexistent technology plan (Ritchie, 1996). Even teachers with positive attitudes toward technology integration sometimes experience hurdles in the implementation and the integration process due to lack of professional development (NCES, 2000), lack of access to equipment, lack of support, and lack of time (Office of Technology Assessment, 1995).

Several studies investigating teachers’ attitudes and beliefs toward technology, both preservice teachers and in-service teachers, suggested that negative attitudes and beliefs toward technology must be addressed so that teachers can successfully integrate technology into their instructional practices (Karsten & Roth, 1998; Kinzie, Delcourt, & Powers, 1994; Milbrath & Kinzie, 2000; Torkzadeh & Koufteros, 1994; Torkzadeh & Van Dyke, 2002). Lack of release time to allow teachers to learn how to integrate technology and lack of sufficient time for the students to indulge actually in technology in class (NCES, 2000) are the major reasons teachers have negative attitudes toward technology. Consequently, teachers avoid using computer technology regularly in their instructional practices (Solomon & Schrum, 2002). The NCES (2000) reported that teachers are likely to integrate technology into their instructional practices if they have access to adequate equipment and connectivity. Teachers need technical and instructional
support in schools (Ronnkvist, Dexter & Anderson, 2000) to work with technology plans that provide a vision for technology programs (National Center for Technology Planning, 2004).

The lack of teachers’ proficiency in technology is another barrier that is of great concern to the integration of technology to the educational arena. Many researchers continue to report that there is a tremendous lack of technological proficiency among teachers and that the demand and desire by schools for educational technology development is great (ISTE, 1999; NCES, 1999; Office of Technology Assessment, 1995; Willis, Thompson, & Sadera, 1999). Teachers’ proficiency levels in technology involve the following areas: general computer knowledge and skills, ability to use Internet, ability to e-mail, ability to use word processing, use of databases and spreadsheets, and technology integration knowledge and skills. Both national and state standards have been established to improve teachers’ technology proficiencies. The ISTE (2000) recently published the National Educational Technology Standards for Teachers as guidelines for teacher education programs to integrate technology instruction into their preservice programs and teacher education programs. The National Council for the Accreditation of Teacher Education adopted these teacher technology standards when accrediting teacher education programs. The National Council for the Accreditation of Teacher Education standards now require accredited schools of education to provide adequate access to computers and other technologies for teachers.

Abbot (2003), in a nationwide survey of teachers, students, and administrators, conducted for the Bill and Melinda Gates Foundation, discovers that over 53% of the teachers surveyed did not routinely use technology in the classroom. The lack of
technology skills and technology-supported pedagogical knowledge among teachers have
been identified as major barriers to technology integration (Snoeyink & Ertmer, 2002;
Williams, Coles, Wilson, Richardson, & Tuson, 2000). Snoeyink and Ertmer (2002), in
their study of a middle class school in the United States, discover that limited computer
knowledge and skills contributed to the lack of technology integration by teachers. The
teachers in this study did not use technological activities with their students until they,
themselves, learned the basic skills of computing. Williams et al. (2000) discover that a
lack of technical skills in the use of databases and spreadsheets was also a factor that
hampered more than 10% of elementary school teachers in their technology usage.
According to Hughes (2005), teachers and administrators need a technology-supported
pedagogical knowledge and skills base on which they can reflect when integrating
technology into their instruction. The technology-supported pedagogical knowledge
includes technology functioning as a replacement to strategies serving as a different
method for achieving the same instructional goal that will subsequently provide
innovative technology opportunities. Therefore, in order to eliminate the lack of teacher
proficiency as a barrier, teachers require effective professional development programs
and adequate classroom support.

The lack of technology-related resources in schools is also a barrier that has
contributed to the low level of technology integration in K-12 schools (Karagiorgi, 2005;
O’Mahony, 2003; Pelgrum, 2001; Sandholtz, Ringstaff, & Dwyer, 1997). Access to
technology involves having the right technology in terms of amount and quality in the
appropriate locations where teachers and students can use them to support and enhance
teaching and learning (Fabry & Higgs, 1997). Research studies showed that the digital
divide exists among both teachers and students (Kavanaugh-Brown, 2000). In addition, many teachers have reported that, oftentimes, there simply is not enough time to locate, evaluate, and find ways to incorporate Internet resources into the curriculum (Butzin, 2001; Cuban, Kirkpatrick, & Peck, 2001; Karagiorgi, 2005; O’Mahony, 2003).

Technology-related resources also include technical support. Accordingly, the lack of technical support is another resource-type barrier to technology use (Lai, Trewen, & Pratt, 2002; Rogers, 2000). Becker (1991), in his study of 31 schools, discovers that, even when schools had many technology resources, the teachers often adhered to traditional classroom approaches and rejected the use of computers due to the lack of technical support. Available technology support is, therefore, a critical factor to successful technology integration in education and schools.

In addition to teachers’ negative beliefs and attitudes toward technology, their low level of technology proficiency, and lack of technology-related resources in school, lack of institutional vision is another significant barrier that affects technology integration in K-12 schools. The vision of how and why technology is to be used in schools is critical in identifying where an institution is going with technology and how it is going to reach its goal with technology. Without a clearly defined vision that is known and understood by all stakeholders, everyone will struggle, and technology implementations will not have the structure or support necessary to sustain learning environments in which technology is integral to student achievement. Many administrators lack the vision necessary to provide technology leadership for the effective use of technology in schools. Without institutional vision, which is a unified, supportive vision, the organization will perish. School leaders should possess the visionary leadership necessary to make change efforts
and integrate technology at the institutional level. Some researchers suggested that a lack of this sort of visionary leadership “may be one of the major reasons schools are not important players in the Information Age” (Lumley & Bailey, 1997, p. 72). Without vision that creates a complete understanding of computer technology’s capabilities, “principals will not be ready to provide the technology leadership needed to restructure their schools through technology” (Hope & Stakenas, 1999, p. 27).

Closely related to the institutional vision regarding technology discussed above, another factor that is an impediment to successful technology integration is the lack of informed leadership (Flanagan & Jacobsen, 2003; Gibson, 2001; Ritchie, 1996). Informed leadership principals are ill-prepared for their new roles as technology leaders and, often, lack the knowledge needed to make informed decisions regarding technical and logistical issues (Flanagan & Jacobsen, 2003). They lack formal training and familiarity with computers and technology. Furthermore, the leadership perspective we hold regarding technology integration affects how we strategically introduce and plan for technology use in schools. Dexter (2000) contends that “it is more appropriate to view technology leadership as an attribute of schools than an attribute of individuals” (p. 21). Leadership is critical to the integration of technology (Brooks-Young, 2002; Geer, 2002; NCES, 2000), thus, strong technology leadership will impact technology integration significantly in schools. The failure to develop a shared vision and to create effective goals of how technology should be used to improve teaching and learning will definitely impede students’ success. Also, leaders need to be informed and be prepared with strategic plans equal to foreseeable challenges; thus, vision is closely associated with informed leadership (Gahala, 2001; Hughes & Zachariah, 2001). Research has shown that
school leadership can affect the integration of technology by teachers. In a study of Hong Kong teachers, Fox and Henri (2005) find that the teachers believed that their principals did not understand technology or its relevance. As a result, the teachers' technology practices were restricted in their classrooms.

Principals and other school leaders will have to accept the challenge to create the conditions necessary to empower teachers and students to engage in risk taking and experimentation with new technologies (Hughes & Zachariah, 2001; MacNeil & Delafield, 1998). Recent studies suggested that the most important issue in the effective integration of educational technology in schools “is the presence of informed and effective leadership” (Gibson, 2001, p. 43), rather than preparation of teachers in technology usage. One reason for the lack of informed leadership in technology “has been the struggle to identify the ‘administrator knowledge base’ needed in technology and the management of technology in the school situation” (Awalt & Jolly, 1999, p. 4). Informed leadership requires principals to serve as role models. Successful integration of technology in schools requires effective leadership through modeling technology use, being a visionary, and acquiring personal proficiency in educational technology. Specifically, “leaders need to model the use of technology to change and improve the environment in which educators function . . . This potential will only be realized if leaders through assuming the lead role realize this potential” (Costello, 1997, p. 58). This method presents new and exciting opportunities for school leaders to alter dramatically the way schools function. It is imperative that principals become “role models as technology users and supporters for students, teachers, and support staff” (Heaton & Washington, 1999, p. 4). Being a role model for effective technology use, however,
becomes problematic when principals’ skills in this area are weak. Therefore, there is a
need for technology leadership in schools and, especially, in elementary schools where it
appears that focus is lacking.

Technology is increasingly essential to all educational environments, including
elementary school environments. Technology will motivate positive social change,
enabling educators to prepare their elementary students to meet the needs of a
technology-driven global environment later on in life. Technology is the future, so it is
important for elementary school students to learn it, use it, or they will be left behind.
Today’s world is a technological one. Living in the 21st century requires elementary
school students to learn more than just the basic reading and writing skills (International
Technology Education Association, 2006). Technology skills are important for students
to learn earlier in their lives. “Technological literacy is fundamentally important to all
students” (International Technology Education Association, 2006, p. 1). Elementary
schools need to prepare students to meet these technological challenges in a world that is
technology driven (Becker, 2000).

The Need for Technology Leadership in Education

The three dimensions of effective technology leadership are (a) proficiency in
educational technology; (b) perception of educational technology; and (c) associating
skill, behaviors, and values common to all leadership in educational technology (Valdez,
2004). This dissertation evaluated only the first two dimensions. The third dimension was
beyond the scope of this study. As previously discussed, although a number of factors
have led to a minimal integration of technology in most U.S. schools, the lack of
informed and strong technology leadership appears to be one of the major barriers to
seamless and successful integration. The leadership principals provide for teachers is one of the most important factors that influence the effectiveness of technology patterns (Jones, 2001). Still, principals must have sufficient knowledge of technology to guide them in their decision making. Principals should understand the power of planning and the need to create a technology plan to support instructional goals and objectives for their schools (Holland & Moore-Steward. 2000). Principals should be strong visionaries with a good knowledge of technology and an understanding of the pedagogy that brings innovation to the classroom and to students’ learning (Hughes & Zachariah, 2001).

Technology can be a major catalyst for change or a waste of valuable resources. It is the responsibility of principals to make the right decisions regarding technology acquisition, integration, and use in their schools.

Technology leadership is a combination of strategies and techniques that are common to all leadership but requires specific attention to understanding how technology can improve instructional practice and implementing strategies for helping teachers use technology in their classrooms (Schmeltzer, 2001). In addition, technology leadership involves understanding the role and impact of technology on society; accepting the responsibility of living in a technologically oriented information age; and using technology as a tool for obtaining, organizing, manipulating information for communication and creative expression (Uchida, Cetron, & McKenzie, 1996).

An essential factor that leaders should consider in successfully integrating technology in schools is the establishment of clear educational goals. Schools must have clear educational goals for their students and a vision for helping students achieve these goals through the use of technology (Barnett, 2003; ISTE, 2005; North Central Regional
Educational Laboratory, 2005). Technology must be a part of the shared mission of the school, and school leaders must communicate this vision through words and actions (Flanagan & Jacobsen, 2003). School and school district leadership must be proactive and provide the needed support for the integration of technology into the curriculum (CEO Forum on Education & Technology 2001; ISTE, 2006; Northwest Regional Educational Laboratory, n.d.). Thus, a long-term commitment must be made to technology integration (Barnett, 2003).

School leaders play a pivotal role in determining how well technology is utilized in their institutions. In order for teachers and students to use technology to their full potential they must have the support and vision of tech-savvy principals (Holland & Moore-Stewart, 2000). School leaders who are technologically literate are in a better position to determine the type of technology to implement in their schools and to evaluate whether the technology implemented has improved learning for all students. When principals model perceptive use and lead staff through sound daily practice, the technology integration program is more likely to prosper (McKenzie, 2002). Willis (2000) believed that, “the most effective way school leaders can promote technology use is that they themselves become knowledgeable and effective users of technology” (p. 6).

Unfortunately, few studies and articles focused on principals’ roles and competencies in technology leadership. The researcher of this study used different descriptors such as technology leadership, principals’ technology leadership, elementary schools, technology education, technology in schools, principals and technology, and elementary school’s technology to conduct this search. A search of the ProQuest, Academic Search Premier (EBSCO), and ERIC (EBSCO) databases yielded only six
studies of elementary principals’ technology leadership from 1984 to 2009. By evaluating the current status of technology leadership of public elementary school principals, this study contributed to the literature and to professional practice in the arena of training and preparation of school leadership at the elementary level. By identifying the strengths and weaknesses in elementary principals’ technology leadership, findings from this study will improve the training of future principals in graduate education programs and will identify areas of technology leadership where professional development is needed for current principals. By examining what competencies school administrators perceive as having the most value in the context of their daily responsibilities, this study provided new valuable information on how best to prepare future school administrators.

Problem Statement

Too often, technology is not used properly or not used at all to facilitate learning. Not only does this waste the resources expended on technology, but, more importantly, this wastes the opportunity (potential benefit) to integrate technology effectively. Many demands are made on school principals; technology leadership is just one. The role of the elementary school principals’ technology leadership is not well understood.

The principal is the leader through whom everything flows at the building level. He or she is the leader of the school and is responsible for everything that takes place in the building, instructionally and otherwise. Principals, therefore, are the ones to lead any initiatives and implementation. Technology is the latest tool available for teachers to make schools student centered. It is the duty of the principals to model, support, and use technology to set the tone for the entire school. Studies showed huge investments made in educational technology, but the actual use of technology falls short of its potential.
However, the principals’ technology leadership will determine the success of this initiative. The principals, in displaying their technology leadership, then, have a critical role in the integration and implementation of technology in the classroom. According to Geer (2002), “School administrators are the impetus for successful technology use in schools” (p. 57).

Successful school principals should inspire a shared vision for integration of technology and to foster an environment conducive to the realization of that vision (Yee, 2000). Administrators need to understand the elements and characteristics of long-range planning for technology use, analyze and react to technology issues, possess vision of technology in education and schools, use technology to communicate effectively to all stakeholders, use technology to make informed decisions, and understand how technology can be integrated into all aspects of the teaching and learning process.

**Research Questions**

The study addressed the following research questions:

1. What are the self-reported proficiency levels of Miami-Dade County, Florida, elementary school principals in technology leadership?

2. To what degree do Miami-Dade elementary school principals value technology leadership?

3. Are the self-reported proficiency levels associated with Miami-Dade County elementary school principals’ training in technology leadership (i.e., the number of graduate courses or in-service workshops)?

4. Is the degree to which principals value technology leadership associated with their training in technology leadership (i.e., the number of graduate courses or in-service
workshops)?

5. What are the professional development needs in technology leadership identified by the elementary school principals in Miami-Dade County, Florida?

**Hypotheses**

The study addressed the following hypotheses:

1. Among principals with different numbers of graduate courses in technology leadership, there is no significant difference in the mean self-reported proficiency in educational technology scores on the Educational Technology for Principals Survey.

2. Among principals with different numbers of graduate courses in educational technology, there is no significant difference in the mean scores for the degree to which principals value technology leadership on the Educational Technology for Principals Survey.

3. Among principals with different numbers of in-service training and workshops in technology leadership, there is no significant difference in the mean self-reported proficiency in technology leadership scores on the Educational Technology for Principals Survey.

4. Among principals with different numbers of in-service training/workshops in technology leadership, there is no significant difference in the mean scores for the degree to which principals value technology leadership on the Educational Technology for Principals Survey.

5. There is no significant professional development needs in technology leadership as measured by the difference between the mean self-reported proficiency in technology leadership scores and the scores for the degree to which principals value
technology leadership.

Methodology

This study used a quantitative design to explore the role of elementary school principals as technology leaders (Cresswell, 2005). The researcher collected quantitative data to obtain a full understanding of the research problems (Cresswell, Clark, Gutman, & Hanson, 2003). Quantitative data is obtained from a survey sent to all public elementary school principals in a large school district in south Florida.

Limitations and Delimitations

It should be noted that elementary schools in this study might not be representative of schools at every level. Magnet and other special schools are not included in the sample. Public schools might not be representative of private and parochial schools. The Miami-Dade County School System is similar to many other systems in major metropolitan areas but not representative of all geographical areas. The study confined itself to surveying elementary school principals in the region of south Florida. The researcher reported and analyzed data gathered by a self-reporting survey completed by elementary school principals in an uncontrolled environment. Variables such as time, lack of focus, and attention to detail could not be controlled. The study was limited to Miami-Dade County elementary public school principals who were willing to complete the survey. The researcher had no control over volunteerism.

Assumptions

Because the principals are self-reporting, they are able to assess accurately their own technology leadership skills and the level of importance and actual proficiency. Principals can also accurately assess the ranking of their individual schools. This study
also assumes that the NETS-A are credible and are representative of the administrators’
technology leadership performance.

Definition of Terms

The following terms are defined for this study.

Technology refers specifically to computer-based technologies and includes personal computers, LCD projectors, Smart Boards, PDAs, laptops, and Tablet PCs.

NETS-A are standards that represent a national consensus of the things school administrators need to know and do to support technology integration effectively in schools and go beyond personal productivity or a technology plan (Brooks-Young, 2002). NETS-A is the initiative of the International Society for Technology in Education (ISTE).

Elementary school is a school in the state of Florida that has any combination of grades from prekindergarten to fifth grade.

Elementary principal is the head of the elementary school who guides and directs the staff, students, parents, and the community on a whole; the building-level leader of an elementary school.

School leader is used interchangeably with principal in this study (Portin, Schneider, DeArmond, & Gundlach, 2003).

Professional development is the processes that improve the job-related knowledge, skills, or attitudes, including in-service training, coaching, practices, and other activities (Guskey & Sparks, 1991).

In-service training workshops in technology leadership provide onsite training for principals. In-service training workshops are likely to help principals develop and improve their administrative skill. They are the processes of developing the skills of
technology within the school district of operation. They include the principals’ administrator certification program, the local school district’s staff development programs, the Florida Department of Education in-service management plan, and other education organizations’ offerings in technology training.

*Graduate course work* refers to technology related graduate course work offered by a graduate program in educational administration or educational leadership.

*Technology leadership* refers to school leaders' demonstrations of technological skills and behaviors as needed to be effective technology leaders in their school-based curriculum (Flannagan & Jacobsen, 2003; Yee, 2000). It is a combination of techniques and strategies that are general to all leadership but require specifics of technology (Valdez, 2004), including the use of new knowledge and an understanding of how technology can improve instructional practices.

*Educational technology* refers to technology that is used to improve curriculum and instruction in the classroom. This may include, but is not limited to, computers, projection systems, Smart Boards, and automatic response systems. These technological devices assist teachers in exposing young minds to technology, engaging different styles of learners, and improving the quality of instruction in elementary schools.

**Organization of the Study**

The first chapter provided an introduction to this study of Miami-Dade County elementary school principals’ technology leadership by discussing the major barriers to technology integration in the U.S. schools, identifying the need for technology leadership and the need for research on elementary principals’ technology leadership, and presenting the problem statement and research questions and hypotheses. Chapter 2 is a review of
literature in regards to elementary school principals’ technology leadership. Chapter 3 discusses the research methodology and procedures. Chapter 4 presents the data, the data analysis, and results. Chapter 5 presents a summary on the entire study, addresses the discussion, reports the findings and conclusions, and outlines recommendations.
Chapter 2: Review of Related Literature

Introduction

This chapter provides a review of the literature related to the role of principals as technology leaders in their schools. The primary purpose of this chapter is to explore and establish the theoretical framework for conducting this study; the second purpose is to identify the gap among the literature by reviewing existing research studies on principals’ technology leadership.

To this end, this chapter is organized into six major sections. The first section explores educational leadership in the 21st century, the second section discusses the emerging role of technology leadership for school administrators, the third section explains national education technology standards for administrators, the fourth section presents Florida’s principal leadership standards, the fifth section examines current status of technology leadership training and professional development for school administrators, and the sixth section is a review of existing research studies on principals’ technology leadership in K-12 education in the United States.

In order for technology to fulfill its promise in education, strong principal leadership is essential, and this is well-supported in the literature on technology (Creighton, 2003; Wilmore, 2000). Anderson and Dexter (2005), using data from the 1998 Teaching, Learning, and Computing Nationwide Survey, examined technology leadership characteristics and their effect on technology integration and confirmed that technology leadership has a greater impact than technology infrastructure on technology-related outcomes. Responding to the lack of prior research on technology as a common component of elementary schools, the need for this study was to explore the self-reported
proficiency of elementary school principals as technology leaders and examine the degree to which they value administrative and instructional technology within the school they lead.

Elementary school principals are portrayed in this study because of the fundamental learning that begins at that stage of the elementary students’ development. Lifelong learning is eventually transferred over to the middle school students and, subsequently, to the high school students.

It is important for the elementary school students to begin using their visual, their auditory, and their kinesthetic sensory abilities to secure technology in education. With the exposure of technology from a tender age, students will be motivated as they use their senses in their technological engagements.

Paige (2002), the U.S. Department of Education Secretary, wrote the following while in office about the American education system:

Schools remain unchanged for the most part despite numerous reforms and increased investments in computers and networks. The way we organize schools and provide instruction is essentially the same as it was when our Founding Fathers went to school. Put another way, we still educate our students based on an agricultural timetable, in an industrial setting, but tell students they live in a digital age. (p. 4)

Therefore, in order for that change to take place, the educational environment is in need of exemplary school administrators who will lead schools through these changing times. Beginning with the elementary school, leaders will assist our nation in getting our students ready for college or the workplace starting from an early age.
Too often, it appears the focus of technology education is lacking at the elementary level, causing students to lag behind in the upper grades. But as one author stated, “Education no longer determines just the competence of the individual in the market place, but also the ability of the nation to secure and maintain a workforce and compete globally” (Business-Higher Education Forum, 2003, p. 11).

**Educational Leadership in the 21st Century**

The technology that has so dramatically changed the world outside U.S. schools is now changing the learning and teaching environment as well. Sometimes, this is driven by the students themselves who were born and are comfortable in the age of the digital technology. Society has clearly reached a turning point in that, all over this country, people see evidence of a new tool to enhance students’ achievements in education, a new determination, and a hunger for change.

Since the conception of the Internet in the early 1960s, there has been an explosive growth in the availability of online instruction and virtual schools, complementing traditional instruction with high quality courses tailored to the needs of individual students (Fullan, 2001a; Wheatley, 1999). Besides, tests can now be taken online, giving students, teachers, and parents almost instant feedback. This is a major step forward in tracking progress and identifying needs (Lashway, 2002b). Moreover, new student data management systems have greatly facilitated the collection and use of tests and demographic and other data for more effective design and management of instructional programs in the 21st century (U.S. Department of Education, Office of Educational Technology, 2004).

A number of recent studies showed that, not only are changes now taking place in
the nation’s school systems, but also we as a nation are beginning to see dramatic improvements in student achievement (Cawelti & Protheroe, 2001; Fullan, 2001a). The new testing, reporting, and accountability requirements of the NCLB Act of 2001 are accelerating this trend. The United Stated has gone from being considered a nation at risk to, now, more accurately being described as a nation on the move. As these encouraging trends develop and expand over the next decade, facilitated and supported by our ongoing investment in educational technology and led by the drive, imagination, and dedication of a reenergized educational community at every level, we may be well on our way to a new golden age in American education (National Education Technology Plan, 2005).

Technology leadership in 21st-century schools requires dealing with and managing change, and many leadership theorists appear to echo the ideas of Senge (1990) in his writings regarding the need to understand the nature of change as it impacts leadership in this area. Senge (1990) declares that significant change will require imagination, perseverance, dialogue, deep caring, and a willingness to change on the part of school leaders in order for them to embrace fully and become stewards of technology within their organizational and learning environments. Fullan (2001a) states that change is a double-edged sword, and, with its relentless pace, we are being forced to run ahead of ourselves, “yet when things are unsettled, we can find new ways to move ahead and create breakthroughs not possible in stagnant societies” (p. 162). This is the path we must take in a technologically driven society although Wheatley (1999) points out that the worldview is anchored in Newtonian thinking and that this view severely limits our ability to cope with the existences of a changing world. Principals cannot be part of this Newtonian mode of thinking if they are to be effective technology leaders because
technology is the major force driving change in and outside of the school and classroom environments. Principals who strive to be technology leaders must view the world as described by Wheatley who contends that we should look at the world as an entity that co-evolves with us, where chaos and complex systems are self-organizing. She believes that people need to have an understanding of these systems, and partnering is what makes change possible. Technology-oriented administrators understand the importance of collaboration and partnership in securing technological tools and systems for their schools. They must accomplish this in a complex and rapidly changing world by focusing on control and looking for order where change brings chaos (Wheatley, 1999).

Papert, in his 1996 work, indicates that “a more balanced view of how computers can contribute to educational change will develop, and while its details cannot be predicted, there are many signs that this time, technology is here to stay” (p. 162). Seen in that light, technology becomes more than an object at work; it becomes a metabolism. Papert’s position, then, holds true today because we see more and more promise in the new models of teaching and learning to support students in these times. The changing dynamics of the teaching and learning environment are not only influenced by technological changes, but, also by the paradigm of the more student-centered, constructivist classrooms.

Another factor instrumental in the process and call for change in modern schools takes into consideration ideals similar to the culture of learning organizations and lifelong learning. Senge (1990) discusses the need for lifelong learning to occur and that, in order for fundamental shifts in thinking to take place, the culture must change. Educational technology creates the need for change, and educators need to be prepared to lead that
change through vision and technology integration.

**The Role of the Principal**

Along with the changes of teaching and learning environments, the role of a principal has changed immensely through the 21st century. Previously, there was the traditional view of the industrial model of school leadership, which concentrated on the uniform and effective delivery of resources, until the publication of *A Nation at Risk* in 1983 (as cited in Valdez, 2004). Principals are now acknowledged to be the primary instructional leaders for the schools, although, the managerial and utilitarian aspects of school leadership have not reduced significantly since the *A Nation at Risk* publication. Today, principals are typically classified as multipurpose leaders. They are organizational leaders, strategic leaders, instructional leaders, political leaders, community leaders, and change leaders as well as technology leaders (Brockmeier, Sermon, & Hope, 2005; Buckner, 1997).

Among the multiple roles that a school leader takes on, technology leadership appears to be the most global (Fullan, 2001a). In the interest of giving the reader a more complete understanding of the need for principals to be technology leaders, the researcher will expound on some best practices in technology leadership in education. Some of the best practices include: building vision, managing change, changing culture, and developing a stronger staff. These practices are directly related to teaching and learning and represent a change in teacher pedagogy, student achievement, and digital equity that is precisely where the principal is required to play a pivotal role.

In order for change to yield desired results in teaching and learning using current technology successfully, school administrators must develop and share their visions of
the role of technology in education. Building vision directs positive school change (Fullan, 2001a, 2001b). A coherent vision specifies the particular values and beliefs that will guide policy and practice within the school. Ideally, the school board and superintendent set a broad vision for all schools in the school district, and, within that context, the principal coordinates the process of arriving at a particular vision for each school. The creation of a vision is not a static event because the vision must change as culture changes (Kotter, 1996). As Senge (1990) notes, “At any one point there will be a particular image of the future that is predominant, but that image will evolve” (p. 1). The principal who is able to adapt a vision to new challenges will be more successful in building strong school cultures. In building vision, principals develop a collaborative, technology-rich school improvement plan that is grounded in research and aligned with the school district strategic plan and promote highly effective practices in technology integration among faculty and other staff. A vision for creating a healthy school culture should be a collaborative activity among teachers, students, parents, staff, and the principal. A more useful approach is to create a shared vision that allows for collaborative school cultures. “A collective and shared school vision is a characteristic of an effective school” (Glickman, Gordon, & Ross-Gordon, 2007, p. 1).

Managing change is a complex task in technology leadership. This involves a learned skill of successful leadership. When the school leader manages the change, he or she will remain client centered, proactive and focused (Leithwood & Riehl, 2003). However, school leaders need to understand the change process in order to lead and manage change and improvement efforts effectively. They must learn to overcome barriers and cope with the chaos that naturally exists during the complex process of
change (Fullan & Miles, 1992). School leaders appreciate the collaboration of working in teams to facilitate development and the working together of team members, which leads to school improvement initiatives. In managing change, school leaders also use the resources and expertise of parents, businesses, and social service and community agencies to foster the academic, emotional, and social well-being of students. This is achieved through extraordinary communication. They are able to understand and overcome resistance to change and build teachers’ sense of efficacy through a well-articulated vision (Tschannen-Moran & Barr, 2004; Tschannen-Moran & Gareis, 2004). School leaders recognize and foster the knowledge, will, and skill required for successful change (North Central Regional Educational Laboratory, 1995).

Change in leadership can lead to change in the organization’s behavior. Changing culture correlates strongly with increased student achievement and motivation as well as teacher productivity and satisfaction (Stolp & Smith, 1994). Principals try to understand the existing culture at their schools in order to build relationships and fulfill current and future needs in the organizations. The most effective change in school culture happens when principals, teachers, and students model the values and beliefs important to the institution (Michigan State University, 2004). The actions of the principal are noticed and interpreted by other nonadministrators as what is important. A principal who acts with care and concern for others is more likely to develop a school culture with similar values (Stolp & Smith, 1994). Principals should work to develop shared visions rooted in history, values, and beliefs of what the school should be; hire compatible staff; face conflict, rather than avoid it; and use storytelling to illustrate shared values. In addition, principals need to understand the important role staff development plays in fostering
technology leadership (Deal & Peterson, 1990).

Significantly, staff development includes high-quality, ongoing training programs with intensive follow-up and support. It refers to high-quality technology support services used to enhance and motivate positive relationships. These trainings and services foster a change in staff behavior and, subsequently, result in an increase in student achievements. Effective staff development in technology leadership focuses on teaching and learning. It also focuses on the number of students potentially impacted by technology leadership, rather than the number of teachers trained. Effective technology staff development begins with system-wide administrative and leadership support. It includes not only the actual instructional event, but, also the development of an implementation plan, the development of an assessment plan, and the completion of both to evaluate the impact of the staff development (Jakes, 2004).

Subsequently, the administrator must be technologically-savvy in order to understand how technology can support best practices in instruction, curriculum, and assessment and to provide guidance and leadership to teachers. These administrators would be able to reduce problems such as insufficient time for continued learning, limited access to technology, lack of technology support (Kincaid & Felder, 2002), and “model a vision of meaningful use as well as inspire others to attain acceptable levels” (Ertmer et al., 2002, p. 11). Principals, in their role as administrators, need to integrate technology to enhance students’ achievements.

Technology Integration

There needs to be a complete change in pedagogy and, indeed, the entire educational system in order for technology integration to become a tool for teaching and
learning as well as function as new skills throughout educational system. David (1994) stated that the lack of success in technology integration as it relates to educational leadership is directly related to the fact that it is being used to answer the wrong question, which is whether technology integration is improving the effectiveness of schools, instead of transforming them. Sandholtz et al. (1997) stated that “technology’s role in schooling is not obvious, in part because the process and product of formal education remain largely unspecified” (p. 256). Also, Cuban (2001) stated that educational technology has been in schools for several decades, but it still lags behind for its use, despite the fact that those who experienced the benefits of using technology integration in education were optimistic of its potential as a classroom tool.

Mills and Tincher (2002) concluded that “technology integration in classrooms is more about teaching and learning than it is about technology” (p. 3). This philosophy has matured and is getting more attention in educational research. Some hold the mistaken idea that technology integration is about teaching technology when it is really about helping teachers to understand technology use as a teaching and learning tool (Whitehead, Jensen, & Boschee, 2003). As espoused by Sheingold (1990), technology should be as transparent a tool as is the pencil. Rogers, in his 1999 study of teachers who targeted the barriers to adapting to emerging technologies, discovered that connecting the curriculum to technology requires teaching and learning to occur first and foremost. Rogers concluded that “technology plans that center around technology rather than teaching and learning create more barriers than they prevent” (p. 18).

All research studies reviewed on technology integration's best practices have the common theme that principals are imperative to successful and sustained technology
integration in schools. There was also a strong desire among administrators to develop instructional leadership skills for the integration of technology in teaching and learning. This perspective is supported by the Institute for Educational Leadership (as quoted in Johnson & Cooley, 2001):

At the institute for Educational Leadership Forum held in December 2000, principals unanimously agreed that they need time to observe, practice, and search for alternative technological strategies for organizing information, managing instructional data, and teaching. The participants asked for information about technology trends, standards, effectiveness, and efficiency. They acknowledged that they need to be knowledgeable and proactive, so they can lay the groundwork for the future and design the best educational environment possible for their teachers, students and constituents. (p. 43)

The modern learning environments are effective learning environments that use technology to enhance student learning (Johnson & Cooley, 2001), and these environments do not use technology to drive curriculum but, rather, use curriculum to drive technology (Whitehead, 2001). The Chief Executive Officer Forum on Education and Technology (2000) refers to these environments as the digital learning environments that integrate technology into the curriculum that, in turn, develop 21st-century skills in students. The Southeast Initiatives Regional Technology in Education Consortium (SEIRTEC), working with 14 resource poor schools over a 3-year period, discovered that there are at least nine key factors affecting the effective use of technology for teaching and learning, two of which this author found compelling enough to merit mention in his research: “leadership is the single most important factor affecting the successful
integration of technology” (Byrom & Bingham, 2001, p. 124) and “effective use of technology requires changes in teaching, and the adoption of a new teaching strategy can be a catalyst for technology integration” (Hall & Kelly, 2005, p. 28). Therefore, principals need to understand the technology requirements for effective teaching and learning and must integrate them into their schools and foster improvement through a technology rich environment.

SEIRTEC (as quoted in Byrom & Bingham, 2001) defines leadership at the principal level as “the single most important factor affecting the technology integration into schools” (p. 1). SEIRTEC is one of 10 federally funded regional technological programs in education consortia. Specific behaviors exhibited by school leaders that contribute to the successful integration and use of technology included (a) start with a vision; (b) lead by example; (c) support the faculty; (d) focus, focus, focus; (e) share leadership roles; and (f) use evaluation to further professional growth (Byrom & Bingham, 2001).

David (1994) concurs that teachers are finally asking the right questions on “how to use technology to change practice to reach new goals--as a catalyst for change and as a tool in creating, implementing, managing, and communicating a new conception of teaching and learning and a system that supports it” (p. 1). All the new models share common instructional practices such as communication, collaboration, critical thinking, active engagement, problem solving, and independent exploration as well as real-life tasks (David, 1994; Johnson & Cooley, 2001; Zemelman, Daniels, & Hyde, 1998). These best practice tools represent authentic learning activities and should be present in the environment of the modern school. Johnson and Cooley (2001) writes that “considering
these features and attributes, teachers can design effective learning environments that use technology not for its own sake, but to enhance student learning” (p. 3).

**Leadership and Change**

Principals have gone through the phases of administrators and instructional leaders to a broader conception of change agents. A major mandate for school principals is the development of collaborative work cultures with technological focus in the teaching and learning process. Leadership in a culture of rapid change is a topic that is attracting much attention from researchers, and technology is a predominant focus. Leadership requires understanding of the change process. Leaders should lead change; therefore, principals need to implement the change, and, although change cannot be controlled or managed, principals must lead in a culture of change to make a difference. The following researchers have contributed to the concept of leadership and the educators who have become change agents. The work of each is discussed separately.

Fullan (2001a) postulates that the following are the five key components to leading effectively in this culture of change: (a) moral purpose, (b) understanding the change process, (c) relationship building, (d) knowledge creation and sharing, and (e) coherence making. Wheatley (1999) emphasizes relationships and their development. Her specific focus indicates that society needs leaders who help us develop clearer vision and clear up confusion. Wheatley (1999) and Fullan (2001a) take slightly different approaches but came to the same conclusion: People should be led by understanding, coping and creating new systems out of the chaos that is created by an ever-changing environment. In the school organizational structure, the principal is the chief technology leader and must lead culture change.
Change seems to be the most consistent theme in all the literature relating to leadership theory over the past decade. One will find topics relating to leaders as change agents, leaders as facilitators in the change process, leaders’ abilities to adapt to the change, leaders’ abilities in the face of change, and so forth. It is clear, then, that change is the engine driving contemporary leadership narrative. One of the driving forces initiating and sustaining change in school organizations is technology integration, which requires change in leadership practices.

Creighton (2003) states that the introduction of computer technology in schools has boomed into a change cycle baffling to everyone. Students, parents, teachers, and administrators are required to participate in this change cycle because the change affects everyone. This technological change represents a major change in school leadership and school operations. Change is not predictable (Valdez, 2004); it is evitable. According to Fullan (2001a), change can be understood, but it cannot be managed or controlled. This is evident in Burke’s (2002) idea of the paradox of change.

According to Burke (2002), organizations and individuals are simultaneously faced with planned and unplanned change as well as many uncontrollable factors in the environment that initiate and sustain change. The societal context for educational reform has drastically changed. Therefore, school leaders will require very different characteristics, skills, and perspectives to be successful in this technological era. Effectively, they should serve as coaches, lead by example, share leadership, know their staff and students, know their parents and community well, and find a balance between flexibility and decisiveness. This means that school leaders should possess willingness to collaborate and willingness to make tough technological decisions. School leaders make
informed decisions.

Change theories such as those of Lewin (1951), Lippit, Watson, and Westley (1958), and Prochaska and DiClemente (1982) are some of the leading ideas in change management. Lewin’s change theory is today being used to help understand the processes of change in school organization. Change is, indeed, still valid for school principals and requires the active participation of all stakeholders and all those who are involved in the organizations (Prochaska & Diclemente, 1982). Principals must be prepared to lead the technological change (Dawson & Rakes, 2003) and embrace technology in all forms as a tool of change. A retrospective look into the writings on this topic indicates Senge’s (1990) work is probably the most outstanding. He theorized that the evolution of the learning organization goes back to 1973 when Michael wrote a book entitled, On Learning to Plan and Planning to Learn. Michael also published an article entitled, Competence and Compassion in an Age of Uncertainty, in 1983. A synopsis of the central theme of his argument is as follows: “More information has led to an ever-increasing sense that things are out of control” (Michael, 1983, p. 1). Michael (1983) recognized that “inability to control is not necessarily a sign of weakness or incompetence and could help nourish the emergence of more humane and worthy modes of personal behavior and public regulation” (p. 1).

Michael (1983) further expands on his ideas in another article he wrote in 1985 entitled, The New Competence: Management Skills for the Future. “Institutions must develop an attitude that will let them deal effectively with mistakes and anticipate future circumstances as present problems. The price of creativity will be greater tolerance for uncertainty and risk” (Michael, 1985, p. 1). This incorporates change leadership. For
leadership to be effective, the change must spread throughout the organization. Leadership for change means seeking leaders who represent innovativeness. Change knowledge is not about developing the greatest number of innovations but, rather, about achieving new patterns of coherence that enable people to focus more deeply on how strategies for effective learning interconnect. Subsequently, there are standards to guide the change process.

**Technology Leadership for School Administrators**

The digital age has and will continue to reshape the landscape of American education. Today’s digital generation of students who are digital natives (Prensky, 2001) demands different learning environments from that of previous generations (Byrom & Bingham, 2001). Teaching pedagogy is shifting slowly but steadily toward a learner-centered, technology-enhanced paradigm (Johnson & Cooley, 2001). Along with the change of teaching and learning environments, the role of school principals has changed dramatically. Among the multiple roles that a school leader needs to take (as discussed in the previous section), technology leadership appears to be critical in enhancing positive education change in the 21st century (U.S. Department of Education, Office of Educational Technology, 2004).

What are essential to technology leadership are the technology skills that are necessary to become effective technology leaders. Technology skills include the ability to utilize information and communications tools effectively (e.g., using communication, information processing, and research tools such as word processing, e-mail, groupware, presentation software, and the Internet) to access, manage, integrate, evaluate, create, and communicate information. Technology skills also involve the ability to use digital
technology and communication tools effectively to access, manage, integrate, and evaluate information. The skills also entail the ability to construct new knowledge and to communicate with others effectively (Southern Regional Education Board, Evalutech, 2009). Technology leaders use technology as a way of advancing learning and teaching (Bailey & Lumley, 1997). These technology skills mentioned above prove very useful and definitely impact learning.

In addition to technology skills, technology leaders need to possess people skills, curriculum skills, staff development skills, and executing leadership skills (National Staff Development Council, 2010; Southern Regional Education Board, Evautech, 2009). Along with technology skills, these skills positively impact students’ achievement.

People skills involve sharing vision, which can also mean sharing leadership roles (Porter, 2005). People have different types of personalities so it is imperative that people learn to understand each other, express their thoughts and feelings clearly, speak up when their needs are not being met, ask for feedback from others, give quality feedback to others, influence how others think and act, identify problems, find ways how to solve problems, and collaborate with each other. People skills also involve working with others by organizing events and meetings and delegating tasks to members on a work team (NIU Career Services, 2009).

According to the National Staff Development Council (2010), “Staff development skills enable teachers and administrators to use appropriate knowledge and skills regarding group processes to ensure various teams, committees, and departments within schools to achieve their goals and provide satisfying and rewarding experiences for participants” (p. 1). In addition, staff development skills equip teachers and
administrators with professional values and understanding that allow them to enhance the teaching and learning process. Staff development skills strengthen the learning community (Lambert, 2003), and learning leadership skills reflect instructional lessons that are designed for students to engage in critical thinking, inquiry, creativity, and problem-solving strategies (Fahey, 2008; Woods, 2007).

Leadership skills include skills such as listening and observing, self-management, presentation, and negotiation (Dunn & Pope, 2001). McLester and McIntire (2006) described leadership skills as applied skills to focus on the practical side of leadership. Leadership skills involve performing several functions, including setting goals, observing progress, rewarding good behavior, and reprimanding negative actions. Good leadership skills are reflected in a leader’s ability to set goals and motivate and influence others to share and strive to achieve these goals (eHow, Inc., 2010). “Good leadership skills include the ability to encourage team members to solve problems and to perform beyond the minimal expectations” (eHow, Inc., 2010, p. 1).

As discussed in the previous section, a competent and effective school leader is a successful change agent (Hall & Hord, 2001). In order to provide leadership in innovation, leaders need to possess a certain level of expertise in the content area of the proposed challenge, hence, providing a clear vision and effectual guidance. Pejza (1985) believed that “associated with the vision has to be a plan, a way of reaching the goal” (p. 10). Leithwood and Montgomery (1984) concluded that “goals are the long-term aspirations held by principals for work in their schools and no other dimension of principal behavior is more consistently linked to school improvement according to empirical research” (p. 23).
The Principal as a Transformational Technology Leader

In his or her role as the instructional and technology leader of the school, the principal needs to have the ability, skills, and knowledge to integrate technology successfully into the curriculum. The principal has to take on the role of the transformational leader. A transformational technology school leader creates vision; empowers stakeholders; and, subsequently, transforms his or her organization. The transformational technology leader integrates technology into the school’s curriculum through knowledge sharing and participation from other school personnel. Kouzes and Posner (1990, 2003) constructs a questionnaire to measure transformational leadership. This leadership questionnaire is called the Leadership Practice Inventory, which defines effective leadership according to the following five composite areas:

1. Challenging the process. Leaders search for opportunities to experiment.

2. Inspiring a shared vision. Leaders focus on what leaders actually do to construct future visions and to build followers’ support of the visions.

3. Enabling others to act. Leaders make it possible for followers to take action by fostering collaboration (as opened to competition) and support followers in their personal development.

4. Modeling the way. Leaders set examples by their own behaviors. They also help followers focus on systematic accomplishments of large-scale goals, making those goals seem more realistic and attainable.

5. Encouraging the heart. Leaders recognize followers’ contributions and find ways to celebrate their talents and achievements (Kouzes & Posner, 1990, 2003).

Transformational leaders also possess the leadership skills and competencies to
establish a vision while giving direction to their followers, and applying appropriate principles for the integration of technology. Riedl, Smith, Ware, Wark, and Yount (1998) suggest that issues related to technology integration (i.e., vision, time, access, support, and assessment) are not adequately understood by decision makers in the public school system.

Different scholars noted that there is a core set of leadership behaviors that provide the foundation for the successful school leadership (Leithwood 1990, 1994, 1995; Leithwood & Jantzi, 1996). These leadership behaviors include vision, appropriate behavior, group acceptance goals, individualized support, intellectual stimulation, and high expectations. Principals who understand the need for and strive to become effective technology leaders aim at identifying new opportunities for their schools’ leadership teams while inspiring others and communicating the vision clearly and convincingly. This also conveys modeling examples for others to follow and molding their desired dispositions and actions.

In fostering acceptance of group goals, principals aim at promoting cooperation among staff members and encouraging them to work toward a common goal. Principals are better able to foster behaviors and attitudes in their staff members for integrating and leading technology acquisition and use. In providing individualized support, principals demonstrate respect to staff members and show concern toward their personal needs. In providing intellectual stimulation, principals challenge staff members to indulge in reflective practice and provide information and resources to assist with desired practices. In holding high performance expectations, principals demonstrate expectations for excellence, quality, and high performance so that staff members and the school
community can know, in fact, what is expected of them (Leithwood & Jantzi, 1996).

In summary, a transformational school leader for the 21st century needs to be equipped with certain competencies, including basic technology competencies, knowledge and skills of technology integration, the ability to provide and share the visions of technology in education, and the behaviors of and support for technology integration for administrative and instructional purposes in the school setting. Most current models of pedagogy are not receptive to the integration of technology initiatives (MacNeil & Delafield, 1998). Principals need to understand technology and the importance of the impact technology has on management and instruction. Thomas (1999) suggests that school leaders are inadequately trained in educational technology and “there is no strong link between school leadership and educational technology” (p. 3).

National Educational Technology Standards for Administrators

The foregone discussion clearly states that technology leadership plays a vital role in the implementation of technology and technology integration. Realizing the pivotal role of technology leadership in enhancing and transforming the U.S. education in the 21st century, the ISTE, the premier association in improving learning and teaching by advancing the effective use of technology in prekindergarten-Grade 12 and higher education in the U.S., developed and issued the NETS-A (ISTE, 2002, 2009). The NETS-A supplies the standards for school leaders and provides indicators of effective leadership for technology in schools. The standards reflect a national consensus among educational stakeholders concerning school leadership and improved levels of student achievement. The following describes the six areas of the NETS-A:

1. Leadership and Vision: Education leaders inspire a shared vision for
comprehensive integration of technology and foster an environment and culture conducive to the realization of that vision. Educational leaders should also participate in an inclusive school district process by which stakeholders formulate a shared vision that clearly defines expectations for technology use; develop collaboratively a technology-rich school improvement plan, grounded in research, aligned with the school district improvement plan, and congruent with the school district vision for technology use, and promote highly effective practices in technology integration among faculty and other staff.

2. Learning and Teaching: Education leaders ensure that curricular design, instructional strategies, and learning environments integrate appropriate technologies to maximize learning and teaching. They assist teachers in using technology to access, analyze, and interpret student performance data; in using results to design, access, and modify student instruction; and collaboratively design, implement, support, and participate in professional development for all instructional staff that institutionalizes effective integration of technology for improving student learning.

3. Productivity and Professional Practice: Educational leaders apply technology to enhance their professional practice and increase their own productivity and that of others. They use a modern technology-based management system to access and maintain personnel and student records and use a variety of media and formats, including telecommunications and the school website to communicate, interact, and collaborative with peers, experts, and other education stakeholders.

4. Support, Management, and Operations: Educational leaders ensure the integration of technology to support productive systems for learning and administration.
They provide campus-wide staff development for sharing work resources to advance implementation of the technology plan and advocate for adequate, timely, and high quality technology support services.

5. Assessment and Evaluation: Educational leaders use technology to plan and implement comprehensive systems of effective assessment and evaluation. They promote and model the use of technology to access, analyze, and interpret campus data to focus efforts for improving student learning and productivity; implement for teachers' evaluation procedures that assess individual growth toward establishing technology standards and guide professional development planning; and include effectiveness of technology use in the learning and teaching process as one criteria in assessing performance of instructional staff.

6. Social, Legal, and Ethical Issues: Educational leaders understand the social, legal, and ethical issues related to technology and model responsible decision making related to these issues. They secure and allocate technology resources to enable teachers to meet the needs of all learners on the campus better. They adhere to and enforce among staff and students the use of acceptable school district policy, along with other policies and procedures related to security, copyright, and technology use. They participate in the environment safe practices related to the use of technology (ISTE, 2001b).

These NETS-A standards represent a national consensus among educational stakeholders of what best indicates effective school leadership for comprehensive and effective use of technology in schools (ISTE, 2001a). As Knezek, ISTE’s chief executive officer, asserted “(i)ntegrating technology throughout a school system is, in itself, significant systemic reform. We have a wealth of evidence attesting to the importance of
leadership in implementing and sustaining systemic reform in schools. It is critical, therefore, that we attend seriously to leadership for technology in schools” (ISTE, 2009, p. 1). First introduced in 1998, 49 of 50 U.S. states have adopted, adapted, or referenced ISTE’s NETS-A in state department of education documents, including the Florida Department of Education (ISTE, 2009).

**Florida’s Principal Leadership Standards**

The NETS-A are very important to principals at the national level as well as the local and school district levels in all states. Along with other leadership standards, the principals in the state of Florida, including the Miami-Dade County School District, are required to adhere to those standards. The principals in the state of Florida are expected to become high-performing school leaders by acquiring the skills and knowledge necessary to demonstrate mastery of the standards. The Florida leadership standards fall under three categories: instructional leadership, operational leadership, and school leadership.

**Instructional Leadership**

High-performing leaders promote a positive learning culture, provide an effective instructional program, and apply best practices to student learning, especially in the area of reading and other foundational skills. Instructional leadership also refers to teacher evaluation, budgeting, scheduling, and maintenance of school facilities with a deep connection to aspects of teaching and learning. “Effective instructional leaders are intensely involved in curricular and instructional issues that directly affect student achievement” (Cotton, 2003, p. 1). This portion of the strand focuses on alignment of the schools’ curriculum and instruction, as well as data analysis used from multiple sources
Managing the learning environment. High-performing leaders manage the organization, operations, facilities, and resources in order to maximize the use of resources in an instructional organization. These leaders also supervise in such a way that promotes a safe, efficient, legal, and effective learning environment. In this standard, principals provide practical strategies for shaping a collaborative school culture, one that will foster rich learning environments where student achievement is enhanced and community involvement is supported. Throughout this effort, principals demonstrate their ability to handle problems, value attitudes, promote an environment where all are treated fairly and with respect, and create conditions that motivate others to be positive and strive for success. Kellough and Kellough (2003) supported productive learning environments that favor student attitudes and are derived from careful and thoughtful planning.

Learning, accountability, and assessment. High-performing leaders monitor the success of all students in the learning environment, align the curriculum, instruction, and assessment processes to promote effective student performance and use a variety of benchmarks, learning expectations, and feedback measures to ensure accountability for all participants engaged in the educational process (Florida Department of Education, 2006). In this strand, the principals use data to assess and monitor school improvement plans. This requires the use of multiple sources of data to make informed decisions in the improvement process. In this process, the principals monitor and assess student progress and demonstrate skills in evaluating instructional strategies. In the state of Florida, the assessment focus is the Florida Comprehensive Assessment Test.

Operational Leadership

Decision-making strategies. High-performing leaders plan effectively, use
critical-thinking and problem-solving techniques, and collect and analyze data for continuous school improvement. This strand depicts how principals use information to formulate a decision (Rowe & Mason, 1987). According to Petrides and Guiney (2002), decision-making strategies are used to influence the process by which one’s core values and beliefs are fundamental to the decision-making process. The decision-making strategies are a part of the cognitive process and, indeed, involve a lot of thinking. Cassidy (2004) implied that decision-making strategies reflect a type of thinking, remembering, and problem solving. They incorporate thoughtful decisions that enable school leaders to recognize and draw inferences from various cues (Rowe & Boulgarides, 1992).

Technology. High-performing leaders plan and implement the integration of technological and electronic tools in teaching, learning, management, research, and communication responsibilities. Technology refers to the implementation and employment of various technologies within the school. In order for this technology implementation to be successful in schools, technology training programs should be developed, and principals must be first in line to receive. In this strand, technology helps to provide smooth school operations and to increase student achievement. Principals use technology in making informed decisions for the good of the school. School leaders need to be technologically literate, using data-driven information to improve the teaching and learning process (Petrides & Guiney, 2002).

Human resource development. High-performing leaders recruit, select, nurture, and, where appropriate, retain effective personnel; develop mentor and partnership programs; and design and implement comprehensive professional growth plans for all
staff, paid and volunteer. Human resource development provides development opportunities for all staff on a planned basis. These professional developments and in-service workshops are tailored according to individuals’ needs and requests. This strand is related to performance management and meets school and curricula needs. In this strand, school leaders evaluate development activities and individual learning outcomes. Principals provide development opportunities in an accessible manner to maximize individuals’ learning by offering a range of methodologies and prioritize development decisions in terms of their relevance to individuals’ development needs and contributions to achieving school and school district goals.

Ethical leadership. High-performing leaders act with integrity, fairness, and honesty in an ethical manner (Florida Department of Education, 2006). A demonstration of ethical leadership articulates and embodies the purpose and values of the organization. It focuses on organizational success, rather than on personal ego. It is not about the leader as an individual but about the goals and dreams of the organization. Ethical leaders demonstrate honesty and fairness throughout the operations of their organizations and recognize and value the success of people and in the success of the organization. Many organizations have leadership development programs (Freeman & Stewart, 2006). These programs enhance ethical leadership.

School Leadership

Vision. High-performing leaders have a personal vision for their school and the knowledge, skills, and dispositions to develop, articulate, and implement a shared vision that is supported by the larger organization and the school community. Vision is the essence of what the school communicates to its stakeholders in a holistic way through
words, actions, and written material about what the school stands for and hopes for in the future. Nanus (1992) stated, “There is no more powerful engine driving an organization toward excellence and long-range success than an attractive, worthwhile, and achievable vision of the future, widely shared” (p. 3). Vision inspires people. Vision gives people the chance to focus. A school must have a clear vision of where it is going in order to succeed as an effective educational institution. Vision building for the principal is an interactive process. This vision must be valid and compelling (Albrecht, 1994).

**Community and stakeholder partnerships.** High-performing leaders collaborate with families, business, and community members; respond to diverse community interests and needs; work effectively within the larger organization; and mobilize community resources. Community and stakeholder partnerships promote collaboration. Collaboration is an important process in the development of a learning community. Fullan and Hargreaves (1997) state that a collectively shared vision is derived through the collaborative efforts of stakeholders. Fullan (1999) posits that learning is valued by schools, families, and community working together in partnership. This means that principals must invite parents and others in the community to become active partners in the learning process at school, at home, and in the community. Darch, Miao, and Shippen (2004) find that parental involvement enhances student grades, results in positive attitude, and increases their attendance.

**Diversity.** High-performing leaders understand; respond to; and influence the personal, political, social, economic, legal, and cultural relationships in the classroom, the school, and the local community (Florida Department of Education, 2006). Diversity refers to equitable participation and an appreciation of the contributions of all. It is a
concept that refers to our uniqueness as individuals and to our sense of belonging or identification within a group or groups. Diversity refers to the ways in which we differ from each other. Some of these differences may be visible (e.g., race, ethnicity, gender, age, and ability), whereas others are less visible (e.g., culture, ancestry, language, religious beliefs, sexual orientation, and socioeconomic background). In honoring diversity, it is based on the principle that, if these differences are acknowledged and utilized in a positive way, it is of benefit to the quality of our learning and working environments. The goal of this strand is to prepare young people to live cooperatively and respectfully in a diverse world.

The Florida Legislature and State Board of Education recognize multiple pathways for demonstrating the standards required to qualify for a professional educator’s certificate. Florida Statute Section 1012.986 sets requirements for approval of two levels of school leadership programs to ensure capacity and quality of preservice school leadership programs and the development of in-service training of school leaders. Level I programs lead to initial certification in educational leadership for the purpose of preparing individuals to serve as school leaders aspiring to school principalship (Florida Department of Education, 2006).

The new Florida principal leadership standards maintain some of the original 19 Florida principal competencies, but also incorporate others from the Interstate School Leaders Licensure Consortium (ISLLC) Standards for School Leaders, National Council for Accreditation of Teacher Education, ISTE, and National Association of Elementary School Principals. The standards represent the collective wisdom of colleagues in schools, school districts, universities, and professional associations at the state and
national levels and define the importance and responsibilities of effective school leadership in the 21st-century schools. The Florida principal leadership standards align with the National Staff Development Council and Florida professional development standards as well as requirements for the NCLB Act of 2001 (Florida Department of Education, 2006) guide the principals toward students’ achievement.

The role of the principal is, first, as an instructional leader as well as manager of business aspects of the school with a focus on continuous school improvement and student achievement. Emphasizing this role, the Florida principal leadership standards impact all principals, assistant principals, aspiring school leaders, school districts, colleges, and universities with educational leadership programs. Florida school leaders must possess the abilities and skills necessary to address their designated tasks in a high-performing manner. School leaders, commensurate with job requirements and delegated authority, shall demonstrate competence in the Florida principal leadership standards.

In regard to technology, the leadership standards portray technology as high-performing leaders plan and implement the integration of technological and electronic tools in teaching, learning, management, research, and communication responsibilities. The standards allow principals to become aware of the technology, telecommunications, and information systems and also allow them to enrich curriculum, instruction, and assessment. Principals will be able to communicate and get feedback on a plan for technology integration for the school community. They will be given the opportunity to work with tech-savvy staff to plan for increased technology usage. High-performing principals will be able to model the use of technology as a tool in support of educational and community activities, develop an effective teacher professional development plan to
increase technology usage, assess and analyze the extent to which technology has been integrated throughout the teaching and learning environment, increase access to educational technologies for the school according to available resources, have a plan for the provision of support to increase the use of technology already in the school and classrooms, and use technology to support the educational efforts of staff and teachers (Florida Department of Education, 2006).

The Florida Department of Education does not currently provide adequate in-service workshops or professional development on technology leadership for the principals of our schools. The standards, however, afford the principals the right to assess their own developing competency and aspire to develop the expertise of a high-performing leader in all aspects of school leadership. Although these standards guide the principals toward improving their levels of expertise in doing what matters when it comes to improving student achievement, it lacks opportunity in providing technology leadership. The leadership standards for principals focus on instructional leadership using data for effective decision making and key indicators for high-performing principals.

**Current Status of Technology Leadership Training for School Administrators**

With increasing demand for accountability, higher student achievement, and the impact of technology in defining success in education school, administrators must become technology oriented in their leadership activities and approach. School administrators who lack basic technology skills are unable to share their expertise with their stakeholders and may become obstacles to future technology integration within their school districts; however, these same individuals can provide efficient leadership by becoming aware of basic technology skills and tapping into their creative thought
processes, including the creation of a vision as well as the sharing and implementation of that vision through the arrangement of quality professional development, proper planning, and funding (Corey & Wilson, 2006). According to Paben (2002) and Cuban (2001), K-12 technology leaders must model professional as well as educational growth by participating in various professional learning activities so that teachers and support staff can abandon their fear, apathy, or resistance when asked to adopt and integrate technology into their curriculum. School administrators should be part of the solution, rather than the problem, when integrating technology (Corey & Wilson, 2006).

Graduate schools of education should have a unique opportunity to prepare K-12 school administrators as technology leaders in a manner that attends to the emerging need to make individuals feel comfortable with technology, instead of the previous emphasis placed primarily upon setting up new systems and using technology to accomplish rote and repetitive tasks (Kearsley & Lynch, 1992). The following section summarizes current graduate school preparation of school administrators. Graduate schools of education currently focus on technology in a general way when preparing K-12 educators (Hess & Kelly, 2005), despite the fact that technology is becoming increasingly important to the preparation of K-12 school administrators. This broad focus is reflected in the curriculum of graduate schools of education as they prepare educational leaders to meet broad standards at the expense of comprehensive training in key areas (Lashway, 2002a; Van Patten & Holt, 2002). A notable exception is teacher education in which graduate schools of education have made a concerted effort to prepare teachers to integrate technology (Cohen & Brunner, 2000). Unfortunately, this same focus of effort in teacher education does not extend to the administrators who make curricular, purchasing, and hiring
decisions for teaching and learning.

Some research suggested that the broad attention to technology by the administrator preparation programs in graduate schools of education in the United States is not adequate (Hess & Kelly, 2005). Such assertions are consistent with a general finding in the research that graduate schools of education are not adequately developing and maintaining educational administration and leadership preparation programs in general (Lashway, 2003; Levine, 2005; Murphy & Vriesenga, 2004; Young, Peterson, & Short, 2002). Creighton (2003) observes, “Looking closely at principal preparation programs at our universities, the role of the principal as a technology leader is only mentioned, in passing, in the literature” (p. 3). Creighton (2003) further elaborates that “a principal’s mission must now include designing and implementing new strategies to help teachers recognize, understand and integrate technology with teaching and learning in the classroom” (p. 2).

Graduate leadership education programs play a pivotal role in ensuring students have the leadership skills to meet the standards and performance appraisals designed to accomplish the goals of education reform. This requires that attention be given to the characteristics of the prospective graduates’ technology leadership preparation program. Taking graduate courses in technology leadership is of particular importance to administrative development because the implication of administrative leadership for schools exists around a shared leadership model in an empowering professional learning community (Greenlee, 2007). Understanding the leadership development and understanding of students in graduate leadership education courses are essential in enhancing principals’ technology leadership development. Graduate courses in
technology leadership will create rich leadership developmental experiences, and enhance their ability to learn from these experiences. Assessing the technology leadership courses of graduate programs can assist administrative educators in the development of a structured view about the technology leadership development of those they are preparing to be administrative leaders and school principals. Suranna (2000) studies a 5-year leadership preparation program at the University of Connecticut. The study reveals a significant gap in the research regarding the extent to which preservice administrative education program facilitates the development of teacher leadership. Suranna and Moss (2002) explore graduate leadership programs in the context of administration preparation. However, Endress (2000) finds that graduate leadership education programs do not have data or tangible examples of what they do in terms of technology leadership and leadership preparation programs.

One possible reason why K-12 technology leadership preparation programs have not yet addressed the technological needs of K-12 school administrators is that the programs fall under a general lack of attentiveness by graduate schools of education toward educational leadership research and preparation in general (Levine, 2005). Graduate schools of education must address how best to prepare future school administrators in order to meet the growing role of technology leaders in the field. In addition, as technology is becoming increasingly important to educational leaders in American K-12 schools, the preparation of future K-12 technology leaders will need to include teaching general competencies associated with a successful educational leader as well as attending to those qualities that current K-12 school administrators value as important.
Because this study has been designed to examine the current status and professional needs of technology leadership among public elementary school principals in Miami-Dade County, the examination of technology-related graduate courses offered in master’s degree programs in educational leadership and educational administration is focused on the mainstream universities in south Florida, especially in and around the Miami-Dade School District area. These universities include Barry University, Florida International University, Nova South Eastern University, St. Thomas University, and the University of Miami.

At Barry University, the Educational Leadership program is to prepare students to become outstanding leaders in public and nonpublic educational institutions. The technology-related course offered by this program (ECT 687 Technology Applications in Educational Leadership) is a three-credit course that prepares the student to be able to apply computer and technology to the areas of administration and instruction in educational institutions.

At Florida International University, the master’s of science degree program in Educational Leadership composes courses and experiences designed to develop entry-level competencies in the practice of educational leadership. The program incorporates course work that constitutes the modified Florida program in educational leadership and addresses the Florida principal leadership standards and the competencies assessed in the Florida Educational Leadership Examination. The technology-related course in this program is entitled, EDA 6271: Administering Educational Technology, which is also a three-credit course. This course is designed to provide preservice and in-service administrators with the theoretical and practical knowledge necessary for planning and
implementing technology in schools. Students will develop a knowledge base of technology applications essential for educational administrators.

At Nova Southeastern University, the master’s of science in leadership degree program is designed to provide students with leadership skills and training with practical application to become leaders within organizations. The program serves a dual purpose by addressing the growing needs of professionals in business and entrepreneurship as well as practitioners working primarily in education and human services settings. The course, Leadership in the Information Age 3, appears to be the only technology-related course in this program. This course provides students with the tools to create a model of integrated lead through the alignment, development, and improvement of current data system within the organization. Students will develop an understanding of the needs of the organization’s consistency and how to develop continuous improvement processes through the use of technology.

At St. Thomas University, the master’s of science degree program in educational administration comprises courses and experiences designed to develop entry-level competencies in the practice of educational administration. The program incorporates course work based on the School Leaders Licensure Consortium standards. The course work also addresses the 10 core competencies assessed in the Florida Educational Leadership Examination. The technology course offered by this program is entitled, EDA 600 Microcomputer Applications for Educational Administrators. This course is a study of issues and concerns on computer uses in education with an emphasis on technology planning and evaluation in K-12 settings. It encompasses a variety of computer applications for administration and instructional uses.
The University of Miami has closed its Educational Leadership program. The researcher, then, continued to search other universities in south Florida that are adjacent to Miami-Dade County.

The search resulted in a discovery of the same programs being offered at other south Florida universities, including Saint Petersburg College, Florida Community College, University of North Florida, Saint Leo University, Florida A & M University, Edison College, University of West Florida, Florida Gulf Coast University, and Okaloosa Walton Community College. An examination of these universities’ course offerings shows a three-credit, one time course that appears to focus mainly on the basic technological competencies, rather than on technology leadership. The only two exceptions are the technology-related course offered at St. Thomas University and Florida International University that address not only basic technological competencies but also technology planning and implementation to some extent. Nonetheless, if a student does not obtain the skills in one course, then, there appears to be no other course offering that will teach a student those skills. Mehlinger and Powers (2002) contend that “graduate school programs generally are doing a poor job in preparing school principals to be technology leaders” (p. 218). It appears that university Educational Leadership programs are deficient in preparing school leaders to become technology leaders.

The deficiencies identified in preparation of technology leadership programs suggest that emphasis should be placed on technology leadership training for principals. Therefore, it is important that school districts provide high-quality professional development for its school administrators to become more knowledgeable in their technology leadership. As the leaders of technology integration in schools, technology
leadership training must be a priority for school administrators (Dawson & Rakes, 2003; Greer, 2002; Holland, 2000). Principals cannot adequately support technology integration if they do not fully understand it (Cypert, 2004). Therefore, technology training for principals is just as important as technology training for teachers. “Administrators can no longer be naive about technology and be considered good leaders” (Ertmer et al., 2002, p. 16). School administrators need, therefore, to be in the forefront of technology integration in their schools. Lack of technology knowledge and skills can cause technology implementation to fail (Valdez, 2004).

**Miami-Dade County Principal Professional Development in Technology Leadership**

Professional development delivers rigorous, research-based, field-tested learning experiences, programs, and resources for teachers, principals, administrators, and support personnel in order to increase student achievement. These opportunities help staff succeed in their jobs, stay current on latest research in their fields, and prepare for advancement. Professional development also organizes various external stakeholder professional development programs to enable them to engage in implementing strategic priorities. Professional development plays a vital role in achieving the school district’s goals by ensuring comprehensive development opportunities that tap stakeholders’ potential and enhance the knowledge and skills needed for growth.

The Leadership Academy provides innovative and comprehensive workshops; in-service training; and seminar opportunities to school-based, school district-based, and region-based administrative personnel. The program assists administrators to stay current with educational trends, gain familiarity with new operational and instructional procedures, focus on advanced management and leadership skills, and more easily
comply with recertification requirements (Florida Department of Education, 2006). Conversely, the Leadership Academy does not provide workshops on principals’ technology leadership, a necessary factor to impact the variables in this study.

The Principal Preparation program provides a comprehensive competency-based approach to assess and enhance leadership capacity of assistant principals and school district administrators aspiring to principalships. Participants acquire technical and adaptive skills in instructional leadership, operational leadership, school leadership, and urban leadership (Florida Department of Education, 2006). The Principal Preparation program has been granted full approval by the Florida Department of Education and is recognized as a quality leadership preparation program. The 2009-2010 program includes 10 components specifically designed to prepare high-performing candidates in the following areas: (a) Summer Leadership Institute, (b) full-day training on school district professional development days, (c) monthly professional development with experts on a select topic, (d) 360° assessment and leadership growth plan, (e) field experiences, (f) standards portfolio, (g) instructional rounds, (h) professional readings and reflections, (i) job shadowing, and (j) 1-month internship (Florida Department of Education, 2006). Still, technology leadership continues to be lacking.

The Professional Development Initiative, a partnership between Florida Department of Education, Bellsouth, and South Florida Annenberg Challenge, developed PrincipalPortal.net for school principals. The Professional Development Initiative supports the development of programs that serve principals in their redefined roles as entrepreneurs and educational executives. Also, the Florida Department of Education’s Bureau of Educator Recruitment and Professional Development coordinates professional
development efforts for the state of Florida and assists school districts in key initiatives affecting teaching and learning through model professional development programs and in-service workshops. The Florida Department of Education through the Florida Leaders.net Regional Institute provides principals with hands-on practical training and online support to assist them in adopting technology into their school improvement planning process and in modeling effective uses of technology as school leaders.

The Miami-Dade County School District supports its principals through in-service training and web-cast meetings (Great Schools, 2009). In-service training is equivalent to graduates’ credits and courses. The principals can earn only college credits if they are in their validity period of renewing their certification. Six semester hours of college credit or equivalent must be earned during each renewal period. Renewal requirements must be completed during the validity period of the professional certificate and prior to the expiration of the professional certificate. Sixty in-service points in an approved Florida master in-service program are equivalent to 3 semester hours of college credit.

The Alberta Commission on Learning (2006) state that professional development will provide sufficient learning time for administrators to learn to use computers effectively. Miami-Dade conducts in-service training that, according to the Alberta Commission on Learning (2006),

addresses individual principal’s differences and supplement individual strengths. It allows flexibility in programming and instructional learning opportunities and ongoing learning and on-the-job support. It provides an instructional focus, which illustrates how technology can support instructional objectives; and develops school administrators who encourage the technological development of teacher (p.
William Cecil Golden School Leadership Professional Development Program

The William Cecil Golden School Leadership Professional Development Program is a network providing resources and support for Florida school leaders. The program supports three levels of leaders: (a) teacher leaders striving for educational leadership certification; (b) school leaders working toward school principal certification; and (c) high-performing leaders, mentors, and coaches in their continued professional development. The program includes pre- and postdiagnostic evaluation instruments, an individualized professional development plan to facilitate attainment of the Florida principal leadership standards, and an electronic portfolio (Florida Department of Education, 2006). The program develops leaders in the following ways:

1. Supports high-quality reading, science, and mathematics instruction.

2. Provides companion classroom walk-through tools to identify effective practices.

3. Facilitates regional assistant principal training.

4. Offers customized leadership training.

5. Supports leadership team academies, middle school principal leadership academies, and assistant principal academies.

6. Sponsors statewide leadership conferences and regional drive-in hot topic sessions.

7. Provides web-based resources.

8. Provides ongoing mentoring and coaching through the Professional Partners program of retired principals and superintendents.

9. Supports the school leader’s attainment of standards.

Aligned with the Florida principal leadership standards, the Florida School
Leaders website offers high-quality, competency-based, customized, comprehensive, and coordinated professional development for school leaders throughout Florida. The website focuses on instructional leadership through the use of a continuous improvement model that is cyclical in nature. The continuous improvement process is based on standards for high-performing school leaders and focuses on instructional leadership using data for effective decision making and key performance indicators for school leaders.

The Miami-Dade County Public Schools’ Educational Leadership Academy is aligned with the Florida principal leadership standards. The goal of the academy is to attract, develop, and retain high-quality leaders to facilitate the mission of Miami-Dade County Public Schools. University Educational Leadership programs result in Educational Leadership Certification (Level 1), and the School of Continuing and Professional Studies Educational Leadership Academy focuses on School Principal Certification (Level II).

The William Cecil Golden Professional Development Program for school leaders provides high-quality professional development opportunities to insure that school leaders have access to the tools and resources essential to this task. Established by the Florida Legislature in 2006 and coordinated by the Florida Department of Education, the program uses a collaborative network of state and national professional leadership organizations to support the leadership development needs of principals, principal leadership teams, and candidates for principal leadership positions (Florida Department of Education, 2006).

All state-approved university and school district school leadership development programs are required to incorporate appropriate elements of the William Cecil Golden
Professional Development Program to ensure a statewide foundation for leadership
development. This can be found in the State Board of Education Rule 6A-5.081 Approval
of School Leadership Programs (Florida Department of Education, 2006).

The William Cecil Golden Professional Development Program for school leaders
consists of several distinct components that are integrated with Florida’s continuous
improvement model that focuses on student achievement. Components of the program
address the needs of emerging school leaders engaged in formal educational leadership
programs, approved school district principal preparation programs, and school district
professional development programs for current school leaders (Florida Department of
Professional Development Program is being coordinated by a unique statewide
partnership involving educational leadership development providers with proven
expertise in this area (Florida Department of Education, 2006).

**Insufficient Training**

Although the William Cecil Golden Professional Development Program focuses
on educational leadership, preparation programs for principals, principals’ leadership
standards, and professional development program resources, it does not show evidence of
technology leadership training. It provides many high-quality professional development
and comprehensive workshops on school leadership but not about technology leadership.
This leadership training development program is the only statewide professional
development for principals provided by the state of Florida.

Currently, most principals are receiving their technology leadership knowledge
and skills on the job as they perform their duties day by day (Dawson & Rakes, 2003).
Therefore, many of them are subjected to the trial-and-error approach. Although they participate in professional developments and available in-service workshops, many of those programs do not include technology leadership training (Ritchie, 1996). The state of Florida requires its principals to take courses in educational leadership and educational administration, but technology leadership is not a requirement. It is, therefore, safe to say that, as the technology leaders in their schools, technology leadership training must be a priority for principals (Dawson & Rakes, 2003).

In the last few years, programs have been developed for administrators to acquire the technological training by organizations such as the Bill and Melinda Gates Foundation and the Institute for the Transfer of Technology in Education. The Bill and Melinda Gates Foundation committed $100 million to provide access to technology leadership training for every superintendent and principal in the nation. The main focus for these trainings is to implement whole system improvement through the creation of high-performance, technologically driven learning environments (National Staff Development Council, 2004). Although these programs are available to all principals nationwide, the deficiency persists due to the fact that some principals lack the awareness of the value of technology to improve instructional practices. School administrators must be trained in instructional technology to aid teachers and students to use technology in instruction effectively (Miller, 2007).

**Review of Existing Studies on Principals’ Technology Leadership**

Since the release of National Educational Technology Standards for Administrators in 2002, there has been an expansion in the research investigating school leaders' proficiency in technology use, technology integration, and technology leadership
in the K-12 setting. This section is a brief review of these existing studies, the purpose of which is to summarize the common themes and identify the gap in the literature.

One of the earliest study on technology leadership was conducted by Kadela in 2002. The purpose of this study was to investigate the technology leadership standards and technology competencies of the elementary principals in New Jersey and how they integrated technology into the educational environment. The results of in-depth interviews with eight principals revealed that principals with greater technological competencies tended to demonstrate more behaviors in technology leadership, including professional development of staff, technology integration for administrative and instructional purposes, and communication with the entire school community.

A similar study was conducted in 2006 by Weber, in which the researcher conductes a study investigating computer technology use and technology leadership of Texas Elementary Public School principals to determine the principals’ levels of computer technology use and their leadership in technology integration activities as defined by the NETS-A. The population for that study consisted of 4,249 elementary principals from 1,055 public school districts in the state of Texas as listed on the Texas Education Agency website in February of 2005. Eight hundred elementary principals were randomly identified by using the Systematic Sampling Technique. Survey data retrieved from 216 Texas elementary public school principals that led to the formation of the following conclusions. The elementary principals involved in this study reported high-level computer technology use, especially with the computer tools involving communication. Principals also report high level leadership performance to the NETS-A standards. A multiple analyses of variance (MANOVA) revealed no significant
difference in mean scores between the dependent variables of computer use or leadership performance to the NETS-A standards and the independent variables, including the organizational factors of school location, school district spending per student, campus minority status, and campus Title I status (Weber, 2006).

However, a regression analysis from that study reveals a statistically significant positive relationship between principals’ computer technology use and personal variables of training and perceived risk benefit. Another regression analysis revealed a statistically significant relationship between principals’ technology leadership performance to the NETS-A standards and personal variables of training, perceived risk benefit, and perceived pressure to implement technology. Multiple regression analyses reveals no correlation between the dependent variables of technology use and technology leadership (Weber, 2006).

Focusing on the relationship between technology leadership and technology integration, Kozloski (2006) explores and describes the connection between (a) the current state of a school’s technology use, (b) a principal’s methods and strategies for leadership in technology integration, and (c) technology use as a tool or instructional strategy connecting school and pedagogical change with technology as a school reform effort. Kozloski uses a mixed-methodology structure and distributed a quantitative survey to all southeastern Pennsylvania K-12 public school principals. Her qualitative methodology includes in-depth interviewing as a second source of data collection and analysis. The results identified three important technology leadership elements for promoting technology integration: (a) model the use of technology; (b) promote the use of technology through baby steps, hand holding, praise, and encouragement; and (c)
create formal or informal building technology leaders.

Totolo (2007), in her study of information technology adoption by principals in Botswana secondary schools, discovers that the research population was not homogenous; there were early adopters who showed characteristics of transformational leadership as well as late adopters and nonadopters who were still learning how to use computers. Therefore, training on the use of computers should include strategies to alleviate barriers to computer adoption. This study provides a baseline of effective school administrators’ technology leadership for Botswana secondary school principals.

The most recent study on the topic of principals' technology proficiency and technology leadership was conducted by Page-Jones in 2009. The researcher investigates the use of technology in schools, the influence of the principals on technology use, and the kind of technology-related leadership behavior exhibited by the principals. Her survey results reveal strong technology leadership behaviors and extensive use of technology in schools.

Miller (2007) conducts a study to identify aspects of technology leadership in elementary schools. In her study, she explores the role of elementary principals as technology leaders in a large school district in Hampton Roads, Virginia. She also identifies the professional development needs of the same elementary school principals in the area of technology leadership. Using a mixed-method design, Miller collects quantitative data through the administration of the Educational Technology for Principals Survey and qualitative data through in-depth interviews with the same elementary principals. Together, the triangulation of quantitative and qualitative data led to the discovery of significant professional development needs for all six subscales of the
NETS-A standards with the greatest needs in the Leadership and Vision, Learning and Teaching, and Productivity and Professional Practice subscales (Miller, 2007).

Similarly, Oubre (2007) conducts a study on technology leadership proficiency based on NETS-A among school administrators in the 21st-century schools initiative. The participants in Oubre’s study consisted of 130 practicing school and school district-level administrators in two gulf south states, all selected from the 33 school districts participating in the 21st-century schools initiative sponsored by CISCO Systems, Inc. Results of the study show a baseline level of proficiency in NETS-A and reveal statistically insignificant relationships between NETS-A proficiency and age, academic training, professional development, employment history, and attitudes. Also, there are no statistically significant relationship found between NETS-A proficiency and administrator belief in the efficacy of using technology as a medium for instructional delivery. However, there is a significant relationship found between administrator proficiency in change leadership and NETS-A proficiency, which would imply a need to emphasize training in the leadership of change. This study also reveals that many administrators believed that their formal training did not adequately prepare them for technology leadership.

Gaps in the Literature

The review of the existing research studies on principals technology leadership in the above section suggests that principals' technology proficiency is closely related to their levels of technology use; however, results are varied regarding other organizational or personal factors, such as school sizes, school rankings, administrative experience, and age. The review also clearly shows the inconclusive results regarding principals’ self-
reported current proficiency levels in the six major areas of the National Educational Technology Standards for Administrators, identified important elements that led to successful technology integration, and perceived professional needs in technology leadership. It appears that results were also varied from state to state, and the variation resulted from the statewide in-service leadership training programs. It appears that there is little research delineating best practices for preparing school administrators to be effective technology leaders. Again, there is inadequate prior technology training for school principals, and they must be trained in instructional technology as to aid teachers and students in effective use of technology instruction (Daniel & Nance, 2002). Technology training for instructional leaders is vital to the successful infusion of technology into the daily administrative routine of public schools (Holland & Moore-Stewart, 2000). It appears that there is an urgent need to investigate the current proficiency level of technology leadership among elementary school principals in the state of Florida as well as to identify their most needed areas for professional development training in technology leadership. The following study adds to the critically needed body of research in this important field for the 21st-century education.

Summary

Effective leadership by the school principal must be provided for technology to be implemented throughout the school system (Kearsley & Lynch, 1992). Principals must serve as role models in using technology by leading through example (Awalt & Jolly, 1999). This review provides a summary of the literature that is relevant to the educational leadership that is needed to facilitate the integration of technology into the teaching and learning process. The literature shows that principals are considered key players in
successful technology integration in schools. If principals are provided with sufficient and effective professional development training in technology, they can become more effective leaders for technology. Few research studies investigate the current proficiency level of elementary school principals and their need for professional development for technology leadership, which is a part of the research gap.

This study provides information regarding elementary school principals’ technology leadership in Miami-Dade County with emphasis on the level of participation in the technology leadership practices as defined by the NETS-A standards and as designed with an overall emphasis on principals’ technology leadership. Although there is agreement that the principal’s leadership is crucial to effective technology integration and there is agreement as evidenced by adoption of the NETS-A standards as to what the leadership behaviors are, there is little evidence of what principals actually are doing regarding these technology leadership standards. Data about the study of technology leadership is still limited (Anderson & Dexter, 2005). Also, there has been no study conducted so far (as of the time this study was proposed in 2008) looking into elementary school principals’ technology leadership in south Florida. Therefore, the purpose of this study is to investigate the current status of elementary school principals’ technology leadership knowledge and skills and also to evaluate Miami-Dade County elementary public school principals’ self-reported proficiency in educational technology, the degree to which principals value educational technology, and the principals’ professional development needs in educational technology.
Chapter 3: Methodology

The purpose of the descriptive study is two-fold. First, it investigates the current status of technology leadership proficiencies among elementary school principals in Miami-Dade County, Florida. Second, it identifies the professional development needs of elementary principals for technology leadership. The findings of the study will contribute to the body of knowledge in the area of technology leadership, which is critically important to achieving successful technology integration into teaching and learning and preparing students to be competent citizens in the 21st century. Chapter 3 discusses the research methods that are used to conduct the study, including (a) research questions, (b) research design, (c) population and sample, (d) instruments, (e) data collection, (f) data analysis, and (g) research ethics.

Research Questions

The main objective of a quantitative research is to investigate problems that require “a description of trends or an explanation of the relationship among variables” (Creswell, 2005, p. 45). To identify the trends and possible relationships among the key variables in technology leadership, the following five research questions are developed to identify the current status of technology leadership proficiencies and relationships between principals’ technology leadership proficiencies and principals’ prior training in technology leadership:

1. What are the self-reported proficiency levels of Miami-Dade County, Florida, elementary school principals in technology leadership?

2. To what degree do Miami-Dade elementary school principals value technology leadership?
3. Are the self-reported proficiency levels associated with Miami-Dade County elementary school principals’ training in technology leadership (i.e., the number of graduate courses or in-service workshops)?

4. Is the degree to which principals value technology leadership associated with their training in technology leadership (i.e., the number of graduate courses or in-service workshops)?

5. What are the professional development needs in technology leadership identified by the elementary school principals in Miami-Dade County, Florida?

**Research Design**

This study uses a quantitative descriptive method to address the research questions. Quantitative method is characterized by (a) collecting and analyzing information in the form of numbers; (b) collecting scores that measure distinct attributes of individuals and organizations; and (c) comparing groups or relating factors about individuals or groups in experiments, correlational studies, and surveys (Creswell, 2005). Also, Leedy and Ormrod (2001) summarize the quantitative descriptive research method as “involves either identifying the characteristics of an observed phenomenon or exploring possible correlations among two or more phenomena” (p. 191).

To answer the five research questions, quantitative descriptive statistics such as mean, percentage, and standard deviation collected from a Likert-scale survey are needed to identify and describe the current status; meanwhile, quantitative inferential statistics such as $t$ tests and one-way ANOVA tests are used to find out if there existed any significant differences and relationships among the key variables. Therefore, this study could be best described as a quantitative descriptive study using the survey method.
Study Population

The population in this study consisted of 192 elementary school principals in the Miami-Dade County Public School System (Great Schools, 2009). Located on the southeastern tip of Florida, Miami-Dade County Public Schools, one of the 67 counties in the state, is the fourth largest school district in the nation. Miami-Dade County Public School System has 232 elementary schools, serving 350,000 students. Among the 232 schools, there are 40 magnet schools and charter schools, the principals of which are excluded from the study because those schools offered specialized courses and focused on specific learning areas.

The ethnicity rate for the Miami-Dade County Public School System principals is 32% African American, 35% Hispanic, 32% White, and 1% Asian and Pacific Islander and Native American. The gender breakdown is 30% males and 70% females. The elementary school principals in Miami-Dade County Public School System are responsible for ensuring that instructional materials are used to provide instruction to students enrolled at the grade levels for which the materials are designed and to communicate effectively to parents the manner in which materials are used to implement the curricular objectives of the school under Sections 233.34(5) and 233.46(1), F.S. (The School Board of Miami-Dade County, Florida 2009).

The researcher adopts a confidence level of 95% and a confidence interval of plus or minus 5%--widely accepted values in educational research--to determine the survey sample from the study population. The confidence level of 95% means that, if the research study was conducted 100 times, then, the results would be within the margin of error 95 times out of 100 times. Confidence intervals present a range of values on the
basis of the sample data in which the population value for such a difference may lie.

Some methods of calculating confidence intervals for means and differences between means are given with the confidence interval being at plus or minus the standard of 5% with the total population of 192 school principals. To meet the confidence level of 95%, the sample size of 176 was needed for this study with a total population of 192 elementary principals (Riley Research Associates, 2005).

A copy of the Educational Technology for Principals Survey was distributed to the whole population of 192 elementary principals in Miami-Dade County Public School System. One drawback of the survey study was the low response rate, especially surveys to school leaders. In order to increase the response rate in this study to meet or exceed the confidence level of 95%, the research needed a return of 176 survey responses from participants. The researcher increased the response rate of the survey study by following up with telephone calls, visiting the schools, providing the principals with hard copies of the survey, and by sending copies of the survey through school mail.

**Instruments**

“A survey is a measurement process used to collect information during a study by way of questionnaires or interviews” (Cooper & Schindler, 2008, p. 215). The purpose of the survey is to describe the attitudes, beliefs, and behaviors of a population (Patton, 2005). The survey in most cases starts with background or demographic questions, which are questions that assess personal characteristics of individuals participating in a survey (Creswell, 2005). The Educational Technology for Principals Survey is used in this study to collect quantitative data. The survey developed by Allen in 2003 consists of 31 statements measuring principals’ perceptions of their technology and technology
leadership competency on a 5-point Likert-type scale (see Appendix A). The items from the survey were taken directly from the NETS-A (ISTE, 2006). The survey consists of items in the following six subscales: Leadership and Vision (Items 1-6); Learning and Teaching (Items 7-11); Productivity and Professional Practice (Items 12-17); Support, Management, and Operations (Items 18-22); Assessment and Evaluation (Items 23-26); and Social, Legal, and Ethical Issues (Items 27-31). The survey was designed to measure to what degree principals value the 31 statements related to educational technology. This is labeled as Importance on the survey. The survey is also designed to measure principals’ Actual Proficiency on those same 31 statements related to educational technology. The difference between Importance and their Actual Proficiency represented principals’ professional development needs.

Validity and reliability are two important concerns with a measuring instrument. Validity refers to the extent to which measurements achieve the purpose for which they are designed, and reliability is concerned with the accuracy (consistency, stability, and repeatability) of a measure in representing the true score of the subject being assessed on a particular dimension (Simon, 2006). The Educational Technology for Principals Survey instrument was validated (internal validity) and tested for reliability by its developer, Allen (2003), based on a sample of 374 principals in Ohio. Allen used Cronbach’s alpha to measure the internal consistency among the variables for Importance and Actual Proficiency for all six subscales on the survey. The alpha coefficients ranked .7124 to .8335 from the Assessment and Evaluation to Learning and Teaching on the six Importance subscales. The alpha coefficients also ranked .7035 to .8275 from the Assessment and Evaluation to Productivity and Professional Practice on the six Actual
Proficiency subscales. Allen conducted a factor analysis in order to test the construct validity of the instrument. The external validity of the study is limited by the use of a convenience sample, rather than a random sample.

**Data Collection**

“The data collection plan specifies the details of the task. In essence it answers the questions *who, what, when, how,* and *where*” (Cooper & Schindler, 2008, p. 202). In this study, the Educational Technology for Principals Survey was sent and returned by e-mail to the researcher (see Appendix A). The researcher obtained the principals’ e-mail addresses from Miami-Dade County School District’s Office of Operations and on the school district’s website. The researcher received permission from Allen to administer the survey instrument (see Appendix B and C). The survey was distributed to all 192 Miami-Dade County Public School System elementary school principals. A letter of intent was e-mailed to all principals a week prior to the e-mailing of the survey (see Appendix D). The completion of the survey took approximately 15 minutes to complete. Although the quantitative survey was distributed by e-mails, a paper format was made available upon request to principals who did not feel comfortable responding to an e-mailed survey. Also, the researcher made telephone calls and made personal visits to school sites to contact nonresponding participants.

**Data Analysis**

Research shows that data analysis usually involves application of one or more statistical techniques used to test the research hypothesis or answer the research question (Gay, 1992). The quantitative data from the survey instrument were analyzed using descriptive and inferential statistics. The research questions are first analyzed using
descriptive statistical methods. The researcher also uses ANOVA tests and t tests to test the hypotheses. The descriptive statistics generated the mean, median, standard deviations, frequencies, and percentages of respondents for each performance indicator on the measure of Importance and Actual Proficiency. The Statistical Package for the Social Sciences (SPSS), Version 17.0 is used for all calculations. What follows are description of data-analysis methods used for each research question.

Research Question 1 asks, What are the self-reported proficiency levels of Miami-Dade County, Florida, elementary school principals’ in educational technology? This research question is answered using descriptive data. The researcher used the SPSS, Version 17.0 to calculate the percentage, mean, and standard deviation for each performance indicator on the measure of Actual Proficiency as well as for each of the six subscales on the measure of Actual Proficiency.

Research Question 2 asks, To what degree do Miami-Dade elementary school principals value educational technology? This research question is answered using descriptive data. The researcher used the SPSS, Version 17.0 to calculate the percentage, mean, and standard deviation for each performance indicator on the measure of the degree of Importance to which principals value educational technology as well as for each of the six subscales on the measure of Importance.

Research Question 3 asks, Are the self-reported proficiency levels associated with Miami-Dade elementary school principals’ training in educational technology (i.e., the number of graduate courses or in-service workshops)? To gain a deeper understanding of the research question, a personal factor of prior training in educational technology is considered to find out if there was a significant difference between elementary principals’
technology leadership proficiency and their prior training in technology. A one-way ANOVA was conducted to test the following two null hypotheses:

1. Among principals with different numbers of graduate courses and in-service training and workshops in technology leadership, there is no significant difference in the mean self-reported proficiency in educational technology scores on the Educational Technology for Principals Survey.

2. Among principals with different numbers of graduate courses and in-service training and workshops in technology leadership, there is no significant difference in the mean scores for the degree to which principals value educational technology on the Educational Technology for Principals Survey.

Research Question 4 asks, Is the degree to which principals value educational technology associated with their training in educational technology (i.e., the number of graduate courses and in-service training and workshops)? To gain a deeper understanding of the research question, a personal factor of prior training in educational technology is considered to find out if there is a significant difference between elementary principals’ technology leadership proficiency and their prior training in educational technology. Prior training in technology use in this study referred to a minimum of one 3-credit hour, technology-related graduate course received by principals or a minimum of one in-service workshop provided by the Florida Department of Education’s School Leadership Training in Technology. No training in technology leadership refers to no prior graduate course in technology taken by the principals or no in-service workshop received by the principals. A one-way ANOVA was conducted to test the following two null hypotheses:

1. Among principals with different numbers of graduate courses and in-service
training and workshops in technology leadership, there is no significant difference in the mean self-reported proficiency in educational technology scores on the Educational Technology for Principals Survey.

2. Among principals with different numbers of graduate courses and in-service training and workshops in technology leadership, there is no significant difference in the mean scores for the degree to which principals value educational technology on the Educational Technology for Principals Survey.

Research Question 5 asks, What are the professional development needs in educational technology identified by the elementary school principals in Miami-Dade County Public schools? This research question was answered using descriptive data. The professional development needs are identified by the differences between the ratings on the Importance and Actual Proficiency. Means and standard deviations are calculated for each of the 31 items and the six subscales for Importance and Actual Proficiency. A t test is performed to test the following null hypothesis for Research Question 5. The null hypothesis for this question is, there is no significant professional development needs in educational technology as measured by the difference between the mean self-reported proficiency in educational technology scores and the scores for the degree to which principals value educational technology.

Research Ethics

Research ethics can be described as norms or standards of behavior that guide moral choices, behavior, and relationship with others. The main goal for ethics during research is to ensure that participants do not experience any harm (Cooper & Schindler, 2003). Research ethics focus more on compliance with the regulations and less on the
ethical principles. The Institutional Review Board is involved in protection of human right subjects (Perlman, 2006). The protection of human subjects is discussed in the subsections of informed consent and confidentiality.

**Informed Consent**

Informed consent is a form of approval secured from a participant in a proposed research survey or any other type of research design before requesting approval to proceed with the study (Cooper & Schindler, 2003). An introduction letter was sent to each participant asking to participate in the study (see Appendix D). Each participant is asked to review the consent form and approve of the process by signature prior to filling out the survey instruments.

**Confidentiality**

Participants were informed of a confidentiality agreement between the researcher and the participants such that their involvement in the study would be on a voluntary basis and their anonymity was guaranteed. Participants were informed that their individual responses would not be revealed in the finished study.

**Summary**

The purpose of this study is to examine Miami-Dade County elementary school principals’ self-reported proficiency in technology leadership and their professional development needs. To address the purpose, the study adopted the quantitative descriptive method by using the Educational Technology for Principals Survey to collect the data. Descriptive and inferential statistics are used to analyze the data. Chapter 3 defined the research design used to address the research questions and test the hypotheses. It described the target population, sampling method, instrumentation, and
statistical methods used to analyze the data. Chapter 4 is a detailed discussion of the
findings that provides the basis for interpretation and conclusions for the research study.
Chapter 4: Results

Introduction

Although technology is everywhere, there appears to be a lack of implementation and integration of technology, especially in the elementary school system. It is important for elementary school students to learn as much technology as their counterparts in middle and high schools, respectively, so as not to be left behind in the digital world. Technology has the power to transform a classroom into a training ground for the next generation of artists, scientists, entrepreneurs, and leaders and that is exactly who our elementary school students are going to become when they start learning technology at such a tender age.

The use of computers in education opens a new area of knowledge and offers a tool that has the potential to change some of the existing educational methods. Therefore, as computer usage continues to increase in middle and high schools and in the society, as a whole, our education system must also prepare elementary school students to use the computers within the classroom. The use of technology should involve all levels of education, including elementary schools (McCannon & Crews, 2000).

Unfortunately, the use of technology appears to be lacking at the elementary level, and there exist very few studies on elementary school principals’ technology leadership. Therefore, this study is designed to evaluate Miami-Dade County elementary public school principals’ self-reported proficiency in educational technology, the degree of principals’ value of educational technology, and the principals’ professional development needs in educational technology. This chapter presents the results of the data analyses performed to examine the five research questions and to test the five hypotheses of this study.
study.

**Research Questions**

The study addresses the following research questions:

1. What are the self-reported proficiency levels of Miami-Dade County, Florida, elementary school principals in technology leadership?

2. To what degree do Miami-Dade elementary school principals value technology leadership?

3. Are the self-reported proficiency levels associated with Miami-Dade County elementary school principals’ training in technology leadership (i.e., the number of graduate courses or in-service workshops)?

4. Is the degree to which principals value technology leadership associated with their training in technology leadership (i.e., the number of graduate courses or in-service workshops)?

5. What are the professional development needs in technology leadership identified by the elementary school principals in Miami-Dade County, Florida?

**Hypotheses**

In order to explore the research questions further and gain a deeper understanding of the effect of principals’ prior training in educational technology (i.e., technology-related graduate courses and in-service training in technology leadership), the study is designed to test the following hypotheses:

1. Among principals with different numbers of technology-related graduate courses, there is no significant difference in the mean score of self-reported proficiency in educational technology on the Educational Technology for Principals Survey.
2. Among principals with different numbers of in-service training and workshops in technology leadership there is no significant difference in the mean scores of self-reported proficiency in educational technology on the Educational Technology for Principals Survey.

3. Among principals with different numbers of technology-related graduate courses, there is no significant difference in the mean scores for the degree to which principals value educational technology on the Educational Technology for Principals Survey.

4. Among principals with different numbers of in-service training and workshops in technology leadership, there is no significant difference in the mean scores for the degree to which principals value educational technology on the Educational Technology for Principals Survey.

5. There is no significant professional development needs in educational technology as measured by the difference between the mean scores of self-reported proficiency in educational technology and the mean scores for the degree to which principals value educational technology.

**Data-Collection Process**

Once Institutional Review Board clearance from the researcher’s university (see Appendix F) and the permission to use the questionnaire were obtained (see Appendix C), the list of elementary school principals from the Miami-Dade School District were compiled using the school district website and telephone directories. Following this, e-mail and school location numbers were obtained, and e-mail messages were, then, sent to each elementary public school principal in the Miami-Dade School District. The e-mail
message described the nature of the study and solicited participation in the online questionnaire. Miami-Dade County public schools participants were assured, in the e-mail correspondence, that their responses to the questionnaire were confidential and the results would be used solely for the purpose of this study.

The surveys were sent by e-mail through Quia Survey Services to the elementary school principals in the Miami-Dade County School District in south Florida. The first-round responses from the web were low, so the surveys were sent through Quia Survey Services a second time with an accompanying letter beseeching principals who did not respond the first time to do so willingly. As a result of the first and second round of e-mail solicitation, there was a total of 51 responses. In order to increase the response rate, the researcher sent the survey instrument to those principals who had not responded through their Miami-Dade County school e-mail using the school codes. Each time the survey instrument was sent out, the participants received a letter requesting them to participate if they had not already done so. The number of responses to the mail version each week was 21 in Week 1, 10 in Week 2, six in Week 3, three in Week 4, and one in Week 5. There was still a need for more responses. Finally, the researcher decided to make physical contact and visited some of the elementary schools to obtain more responses. As a result, there was a total of 103 responses from a total of 192 elementary public school principals in Miami-Dade County. Data from the survey were summarized and, then, statistically analyzed to generate the results of the study. The following sections present the data summarized for each research question and hypothesis as well as sample demographics.
Participants’ Demographics

Questionnaires were sent out to all 192 elementary school principals in the Miami-Dade County School District in Florida. A total of 103 responses were received during the 1.5-month data-collection period, which represented a 54% response rate for this study (see Table 1). The average range of response rate for academic surveys is between 55.6% and 48.4% with a standard deviation of 20.1, and the average range is even lower for those studies involving school leaders with the average response rate being 36.1% with a standard deviation of 13.3 (Baruch, 1999). The response rate in this study was comparatively high for a survey study of this type involving school principals who usually have overwhelmingly busy schedules.

Table 1

Survey Response Rates

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of responses</th>
<th>% participation rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invited participants</td>
<td>192</td>
<td>100</td>
</tr>
<tr>
<td>Did not respond to electronic invitation</td>
<td>79</td>
<td>41</td>
</tr>
<tr>
<td>Did not wish to participate after personal visit</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Available for analysis</td>
<td>103</td>
<td>54</td>
</tr>
</tbody>
</table>

The initial step in analyzing the data involved a review of the descriptive statistics for each variable. The SPSS, Version 17.0 is used for coding and analyzing the data.

Using the SPSS, Version 17.0 software system, frequency charts are created for each
response to the survey for each principal who responded.

Table 2 displays the demographics of the participants. As the data show, the respondents’ highest degree earned was at the doctorate level, but the majority of the respondents had master’s degrees. Respondents were of a diverse population, namely African Americans, Hispanics, and Whites with the largest ethnic group being that of the African Americans. Although the ethnicity gaps were not large, the highest percentage of the participants was African American, and the majority of the respondents were female principals (77.7%) according to the demographic data.

Table 2

*Participants’ Demographics*

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>80</td>
<td>77.7</td>
</tr>
<tr>
<td>Male</td>
<td>19</td>
<td>18.4</td>
</tr>
<tr>
<td>Unreported</td>
<td>4</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>Highest degree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master’s</td>
<td>59</td>
<td>57.3</td>
</tr>
<tr>
<td>Specialist</td>
<td>13</td>
<td>12.7</td>
</tr>
<tr>
<td>Doctorate</td>
<td>25</td>
<td>24.3</td>
</tr>
<tr>
<td>Unreported</td>
<td>6</td>
<td>5.8</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Africa American</td>
<td>35</td>
<td>34.0</td>
</tr>
<tr>
<td>Hispanic</td>
<td>29</td>
<td>28.2</td>
</tr>
<tr>
<td>White</td>
<td>33</td>
<td>32.0</td>
</tr>
<tr>
<td>No response</td>
<td>6</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Table 3 reveals the participants’ training in educational technology. The majority
of the principals (88%) took one or two technology-related graduate courses with a few principals (16%) having no graduate course experience in educational technology.

Also, more than half of the principals (65%) participated in three or more in-service workshops in educational technology during their daily working hours or on the job. Twelve percent participated in one or two in-service workshops, and 22% had no participation in any in-service training.

Table 3

*Participants’ Training in Educational Technology*

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of technology-related graduate courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>16</td>
<td>15.5</td>
</tr>
<tr>
<td>1</td>
<td>40</td>
<td>38.8</td>
</tr>
<tr>
<td>2</td>
<td>44</td>
<td>42.7</td>
</tr>
<tr>
<td>Unreported</td>
<td>3</td>
<td>2.9</td>
</tr>
<tr>
<td>No. of in-service workshops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>22</td>
<td>21.4</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>6.8</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>4.9</td>
</tr>
<tr>
<td>3 or more</td>
<td>65</td>
<td>63.1</td>
</tr>
<tr>
<td>Unreported</td>
<td>4</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Table 4 summarizes the data about participants’ years of being principals and the number of staff, teachers, and students in their schools. The number of staff who participated yielded an average of nearly 70 with standard deviation of 22.268, whereas the number of teachers yielded an average of nearly 44 with a standard deviation of 16.103. The students were represented by an average of 543 and a standard deviation of 187.205. Together, the years of administrative experiences were 10.59 with a standard
deviation of 7.251.

Table 4

*Means and Standard Deviations for Administrative Experience and School Size*

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of staff</td>
<td>96</td>
<td>69.40</td>
<td>22.268</td>
</tr>
<tr>
<td>No. of teachers</td>
<td>94</td>
<td>43.97</td>
<td>16.103</td>
</tr>
<tr>
<td>No. of students</td>
<td>100</td>
<td>542.12</td>
<td>187.205</td>
</tr>
<tr>
<td>Administrative experience (years)</td>
<td>99</td>
<td>10.59</td>
<td>7.251</td>
</tr>
</tbody>
</table>

**Results for Research Question 1**

This section summarizes the quantitative data used to address Research Question 1: What are the self-reported proficiency levels of elementary public school principals’ technology leadership in Miami-Dade County, Florida? Each item on the survey instrument asked the respondents to indicate his or her proficiency level by selecting a number from 1 through 5 on a Likert-type scale representing a range of *very weak* to *very strong (proficiency)*.

Findings to the first research question were derived from an examination of responses to all the 31 items contained in the Educational Technology for Principals Survey representing the components of the NETS-A standards (see Table 5). Data were also summarized for each of the six areas of the standards (see Table 6).

As the data in Table 5 shows, the overall mean for NETS-A self-reported
proficiency for each individual question was a high of 4.71 and a low of 3.82. The respondents indicate that they were most proficient in the item of “Employ technology for communication and collaboration among colleagues, staff, parents, students, and the larger community” for which respondents yield an average mean of 4.71. Respondents also indicate that they were second proficient in “Use technology to collect and analyze data, interpret results, and communicate findings to improve instructional practice and student learning” with a mean of 4.57. Respondents report their third proficient component is in the item of “Facilitate and support collaborative technology-enriched learning environments conducive to innovation for improved learning” with a mean of 4.56.

Following the most, second, and third proficient components, there were a number of other items that respondents indicate that they are moderately proficient in (mean scores that were between 0.45 and 0.40), including "Ensure equity of access to technology resources that enable and empower all learners and educators" (M=0.45) and "Participate in the development of policies that clearly enforce copyright law and assign ownership of intellectual property developed with school district resources" (M=0.40).

As the mean scores show in Table 5, there are four items that respondents had a mean score that was lower than 4.0, including “Implement procedures to drive continuous improvements of technology systems and to support technology replacement cycles” (M = 3.98); “Develop, implement, and monitor policies and guidelines to ensure compatibility of technologies” (M = 3.97); “Identify, communicate, model, and enforce social, legal, and ethical practices to promote responsible use of technology” (M = 3.94); “Allocate financial and human resources to ensure complete and sustained
implementation of the technology plan” ($M = 3.82$).

Table 5

*Mean Scores of Self-Reported Proficiency on 31 Survey Items*

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean proficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employ technology for communication and collaboration among colleagues, staff, parents, students, and the larger community.</td>
<td>4.71</td>
</tr>
<tr>
<td>Use technology to collect and analyze data, interpret results, and communicate findings to improve instructional practice and student learning.</td>
<td>4.57</td>
</tr>
<tr>
<td>Facilitate and support collaborative technology-enriched learning environments conducive to innovation for improved learning.</td>
<td>4.56</td>
</tr>
<tr>
<td>Ensure equity of access to technology resources that enable and empower all learners and educators.</td>
<td>4.50</td>
</tr>
<tr>
<td>Promote and enforce privacy, security, and online safety related to use of technology.</td>
<td>4.45</td>
</tr>
<tr>
<td>Provide for learner-centered environments that use technology to meet the individual and diverse needs of learners</td>
<td>4.39</td>
</tr>
<tr>
<td>Create and participate in learning communities that stimulate, nurture, and support faculty and staff in using technology for improved productivity.</td>
<td>4.38</td>
</tr>
<tr>
<td>Facilitate the use of technologies to support and enhance instructional methods that develop higher-level thinking, decision making, and problem-solving skills.</td>
<td>4.36</td>
</tr>
<tr>
<td>Use multiple methods to assess and evaluate appropriate uses of technology resources for learning, communication, and productivity.</td>
<td>4.36</td>
</tr>
<tr>
<td>Promote and enforce environmentally safe and healthy practices in the</td>
<td>4.31</td>
</tr>
</tbody>
</table>
use of technology.

Model the routine, intentional, and effect use of technology. 4.29

Advocate for research based effective practices in use of technology 4.27

Use data in making leadership decisions. 4.25

Assess staff knowledge, skills, and performance in using technology and use results to facilitate quality professional development and to inform personal decisions. 4.24

Facilitate shared development by all stakeholders of a vision for technology use and widely communicate that vision. 4.23

Use technology to assess, evaluate, and manage administrative and operational systems. 4.21

Identify, use, evaluate, and promote appropriate technologies to enhance and support instruction and standards-based curriculum leading to high levels of student achievement. 4.21

Maintain awareness of emerging technologies and their potential uses in education. 4.20

Implement and use integrated technology-based management and operation systems. 4.17

Foster and nurture a culture of responsible, risk-taking and advocate policies promoting continuous innovation with technology. 4.14

Maintain inclusive and cohesive process to develop, implement, and monitor a dynamic, long-range, and systemic technology plan to achieve the vision. 4.06

Use technology to advance organizational improvement. 4.05

Engage in sustained, job-related professional learning using technology resources. 4.04
Provide for and ensure that faculty and staff take advantage of quality professional learning opportunities for improved learning and teaching with technology.

Advocate, on the state and national levels, for policies, programs, and funding opportunities that support implementation of the school district technology plan.

Integrate strategic plans, technology plans, and other improvement plans and policies to align efforts and leverage resources.

Participate in the development of policies that clearly enforce copyright law and assign ownership of intellectual property developed with school district resources.

Implement procedures to drive continuous improvements of technology systems and to support technology replacement cycles.

Develop, implement, and monitor policies and guidelines to ensure compatibility of technologies

Identify, communicate, model, and enforce social, legal, and ethical practices to promote responsible use of technology.

Allocate financial and human resources to ensure complete and sustained implementation of the technology plan.

Based on the data displayed in Table 6 (six areas of the NETS-A), principals rate Productivity and Professional Practice as the most proficient among the six areas of technology leadership with a mean of 26.0. The second proficient area is Leadership and Vision with a mean of 24.9 followed by the third proficient area of Learning and Teaching with a mean of 22.0. The area of Social, Legal, and Ethical Issues is the fourth proficient area with a mean of 21.2. Results also reveal that principals are least proficient in the areas of Assessment and Evaluation and Support, Management, and Operations with both having a mean of 20.0.
Table 6

*Mean, Median, and Standard Deviation of Self-Reported Proficiency in the Six Areas of Actual Proficiency*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$M$</th>
<th>Median</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership &amp; vision</td>
<td>24.9</td>
<td>25</td>
<td>2.26</td>
</tr>
<tr>
<td>Learning &amp; teaching</td>
<td>21.5</td>
<td>22</td>
<td>2.05</td>
</tr>
<tr>
<td>Productivity &amp; professional practice</td>
<td>25.7</td>
<td>26</td>
<td>2.44</td>
</tr>
<tr>
<td>Support, management &amp; operations</td>
<td>20.0</td>
<td>20</td>
<td>2.52</td>
</tr>
<tr>
<td>Assessment &amp; evaluation</td>
<td>20.0</td>
<td>17</td>
<td>17.37</td>
</tr>
<tr>
<td>Social, legal, &amp; ethical issues</td>
<td>21.2</td>
<td>21</td>
<td>2.07</td>
</tr>
</tbody>
</table>

**Results for Research Question 2**

This section summarizes the quantitative data used to address Research Question 2: To what degree do Miami-Dade elementary school principals value educational technology? Table 7 looks at the degree of value the principals placed for each item on the survey.

The mean scores of respondents’ degree of value of technology leadership range from a high of 4.85 in the item of “Employ technology for communication and collaboration among colleagues, staff, parents, students, and the larger community” to a
low of 4.41 in the item of “Advocate, on the state and national levels, for policies, programs, and funding opportunities that support implementation of the school district technology plan.” The data also show that the respondents perceive that all components of the survey are very important because, although there was a low of 4.41 in item of “Advocate, on the state and national levels, for policies, programs, and funding opportunities that support implementation of the school district technology plan,” the average mean is still high in comparison to the mean of the self-reported proficiency and the mean is not too far from their highest perception of importance, which yielded a 4.85.

Table 7

Mean Scores of Importance on 31 Survey Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean value</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Employ technology for communication and collaboration among colleagues, staff, parents, students, and the larger community.</td>
<td>4.85</td>
</tr>
<tr>
<td>24. Use technology to collect and analyze data, interpret results, and communicate findings to improve instructional practice and student learning.</td>
<td>4.84</td>
</tr>
<tr>
<td>17. Use technology to advance organizational improvement</td>
<td>4.80</td>
</tr>
<tr>
<td>4. Use Data in making leadership decisions</td>
<td>4.78</td>
</tr>
<tr>
<td>28. Identify, communicate, model, and enforce social, legal, and ethical practices to promote responsible use of technology</td>
<td>4.75</td>
</tr>
<tr>
<td>15. Engage in sustained, job-related professional learning using technology resources.</td>
<td>4.73</td>
</tr>
<tr>
<td>3. Foster and nurture a culture of responsible, risk-taking and advocate policies promoting continuous innovation with technology.</td>
<td>4.72</td>
</tr>
</tbody>
</table>
29. Promote and enforce privacy, security, and online safety related to use of technology.  4.71

9. Provide for learner-centered environments that use technology to meet the individual and diverse needs of learners.  4.71

16. Maintain awareness of emerging technologies and their potential uses in education.  4.70

7. Identify, use, evaluate, and promote appropriate technologies to enhance and support instruction and standards-based curriculum leading to high levels of student achievement.  4.67

31. Participate in the development of policies that clearly enforce copyright law and assign ownership of intellectual property developed with school district resources.  4.67

23. Use multiple methods to assess and evaluate appropriate uses of technology resources for learning, communication, and productivity.  4.66

5. Advocate for research based effective practices in use of technology.  4.66

30. Promote and enforce environmentally safe and healthy practices in the use of technology.  4.66

27. Ensure equity of access to technology resources that enable and empower all learners and educators.  4.66

25. Assess staff knowledge, skills, and performance in using technology and use results to facilitate quality professional development and to inform personal decisions.  4.66

19. Allocate financial and human resources to ensure complete and sustained implementation of the technology plan.  4.64

1. Facilitate shared development by all stakeholders of a vision for technology use and widely communicate that vision.  4.63

20. Allocate financial and human resources to ensure complete and sustained implementation of the technology plan.  4.63

26. Use technology to assess, evaluate, and manage administrative and operational systems.  4.62

11. Provide for and ensure that faculty and staff take advantage of quality professional learning opportunities for improved learning and teaching.
with technology.  

10. Facilitate the use of technologies to support and enhance instructional methods that develop higher-level thinking, decision making, and problem-solving skills.

2. Maintain inclusive and cohesive process to develop, implement, monitor a dynamic, long-range, and systemic technology plan to achieve the vision.

14. Create and participate in learning communities that stimulate, nurture, and support faculty and staff in using technology for improved productivity.

21. Integrate strategic plans, technology plans, and other improvement plans and policies to align efforts and leverage resources.

22. Implement procedures to drive continuous improvements of technology systems and to support technology replacement cycles.

8. Facilitate and support collaborative technology-enriched learning environments conducive to innovation for improved learning.

12. Model the routine, intentional, and effect use of technology.

18. Develop, implement, and monitor policies and guidelines to ensure compatibility of technologies.

6. Advocate, on the state and national levels, for policies, programs, and funding opportunities that support implementation of the school district technology plan.

Table 8 reports the mean scores of Importance principals placed on the six areas. Respondents place the highest importance in the area of Leadership and Vision with a mean of 27.8. Social, Legal, and Ethical Issues is rated the second most important area with a mean of 23.4 followed by Learning and Teaching with a mean of 23.0.

The area of Support, Management, and Operations, which rates the least proficient in Question 1, ranks the fourth important followed by the area of Productivity and Professional Practice with a mean of 21.1. Similar to their response to self-reported proficiency, respondents rated Assessment and Evaluation as the lowest area that they
perceived to be important with a mean of 18.7.

Table 8

*Mean, Median, and Standard Deviation in the Six Areas of Importance*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$M$</th>
<th>Median</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership &amp; vision</td>
<td>27.8</td>
<td>28.0</td>
<td>1.83</td>
</tr>
<tr>
<td>Learning &amp; teaching</td>
<td>23.0</td>
<td>23.8</td>
<td>1.98</td>
</tr>
<tr>
<td>Productivity &amp; professional practice</td>
<td>21.1</td>
<td>29.0</td>
<td>1.97</td>
</tr>
<tr>
<td>Support, management &amp; operations</td>
<td>22.8</td>
<td>23.0</td>
<td>1.90</td>
</tr>
<tr>
<td>Assessment &amp; evaluation</td>
<td>18.7</td>
<td>23.0</td>
<td>1.25</td>
</tr>
<tr>
<td>Social, legal, &amp; ethical issues</td>
<td>23.4</td>
<td>24.0</td>
<td>1.46</td>
</tr>
</tbody>
</table>

**Results for Research Question 3**

This section summarizes the quantitative data used to address Research Question 3: Are the self-reported proficiency levels associated with principals’ training in educational technology (i.e., the number of graduate courses and in-service workshops)? The following two hypotheses were tested to address this research question:

1. Among principals with different numbers of technology-related graduate courses, there is no significant difference in the mean scores of self-reported proficiency
in educational technology on the Educational Technology for Principals Survey.

As the data in Table 9 indicate, the mean score for participants who took no technology-related graduate courses is 132.46 with a standard deviation of 9.44. Participants who took one graduate course averaged 130.72, and those who took two or more graduate courses averaged 130.50.

Table 9

Means and Standard Deviations for Three Levels of Graduate Course Work and Self-Reported Proficiency in Technology Leadership

<table>
<thead>
<tr>
<th>Variable</th>
<th>No courses</th>
<th>1 course</th>
<th>2 or more courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Proficiency</td>
<td>132.46</td>
<td>9.44</td>
<td>130.72</td>
</tr>
</tbody>
</table>

To test the significance of these differences, a one-way analysis of variance (ANOVA) was conducted to evaluate the association between technology-related graduate course work and self-reported proficiency in educational technology. The independent variable, the number of technology-related graduate courses, included three levels: no courses, one course, and two or more courses. The dependent variable was the mean score for self-reported proficiency in technology leadership from the Educational Technology for Principals Survey.

In Table 10, within-group variance estimated the population variance using the means, and between-group variance estimated the population variance using all the data values. Within-group variance relied on relationships in the data set, and the between-
group variance relied on relationships in different settings. The respondents’ between-groups on the $F$ test were represented by 2 in the degree of freedom with a sum square of 47.117 and a mean square of 23.559. Within-groups on the $F$ test (0.237) had a degree of freedom of 97, a sum square of 9639.576, and a mean square of 99.377. The ANOVA was not significant, $F(2,97) = 0.237, p = .789$. Based on the $p$ value, the researcher failed to reject the null hypothesis (i.e., there was no significant difference in the self-reported proficiency in technology leadership among principals who took different number of technology-related courses).

Table 10

*One-Way Analyses of Variance for Effects of Prior Graduate Course Work and Self-Reported Proficiency in Technology Leadership*

<table>
<thead>
<tr>
<th>Variable &amp; source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between groups</td>
<td>2</td>
<td>47.117</td>
<td>23.559</td>
<td>0.237</td>
</tr>
<tr>
<td>Within groups</td>
<td>97</td>
<td>9,639.576</td>
<td>99.377</td>
<td>--</td>
</tr>
</tbody>
</table>

2. Among principals with different numbers of in-service training and workshops in technology leadership, there is no significant difference in the mean self-reported proficiency in educational technology scores on the Educational Technology for Principals Survey.

Data from Table 11 and Table 12 were used to test this null hypothesis. Table 11 shows the results of respondents’ in-service training/workshops and respondents’ self-reported actual proficiency in technology leadership using means and standard deviation.
The results indicated a mean of 136.4 with a standard deviation of 12.15 for respondents who took no in-service workshops. Respondents who took one workshop resulted in a mean of 128.57 with a standard deviation of 4.92. Respondents who took two workshops had a mean of 128.02 mean with a standard deviation of 9.79, whereas those respondents who participated in three workshops had a mean of 130.03 and a standard deviation of 9.71.

Table 11

*Means and Standard Deviations for Four Levels of In-service Workshops and Actual Proficiency in Technology Leadership*

<table>
<thead>
<tr>
<th>Variable</th>
<th>No</th>
<th>One</th>
<th>Two</th>
<th>Three or More</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Proficiency</td>
<td>136.4</td>
<td>12.15</td>
<td>128.57</td>
<td>4.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>128.02</td>
<td>9.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>130.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.71</td>
</tr>
</tbody>
</table>

A one-way ANOVA was conducted to evaluate the relationship between in-service workshops in technology leadership and proficiency of technology leadership. The independent variable, in-service workshops in technology leadership, included four levels: none, one, two, and three or more. The dependent variable was the score for proficiency on the Educational Technology for Principals Survey.

The results showed a degree of freedom of 3 between groups and 95 within groups in the respondents’ self-reported proficiency. The sum square due to the regression was 788.584 between groups and 9418.908 within groups in the actual proficiency.

The mean square was 262.861 between groups and 99.146 within groups in the
actual proficiency with an $F$ test of 2.651. The ANOVA was not significant, $F(3,95) = 2.651, p = .053$. Based on the $p$ value, the researcher failed to reject the null hypothesis (i.e., there was no significant difference in the self-reported proficiency in technology leadership among principals with different number of in-service workshops in which they participated.

Table 12

_One-Way Analyses of Variance for Effects of Prior Training on Actual Proficiency in Technology Leadership_

<table>
<thead>
<tr>
<th>Variable and Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Proficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between-groups</td>
<td>3</td>
<td>788.584</td>
<td>262.861</td>
<td>2.651</td>
</tr>
<tr>
<td>Within-groups</td>
<td>95</td>
<td>9418.908</td>
<td>99.146</td>
<td></td>
</tr>
</tbody>
</table>

_Results for Research Question 4_

This section summarizes the quantitative data used to address Research Question 4: Is the degree to which principals value educational technology associated with their training in educational technology (i.e., the number of graduate courses or in-service workshops)? The following two hypotheses were tested to address this research question:

1. Among principals with different numbers of technology-related graduate courses, there is no significant difference in the mean scores for the degree to which principals value educational technology on the Educational Technology for Principals Survey.

Table 13 shows the results of the graduate course work and the degree of value the respondents placed on technology leadership. The means and standard deviations
were used to analyze the data.

The principals who took one technology-related course have the highest mean of 144.90 with a standard deviation of 8.690; those who took two or more get the second high mean score of 140.35 with a standard deviation of 9.85; and those who took no course work in technology get the lowest mean of 144.90 with a standard deviation of 8.690.

Table 13

*Means and Standard Deviations for Three Levels of Graduate Course Work and Importance in Technology Leadership*

<table>
<thead>
<tr>
<th>Variable</th>
<th>No courses</th>
<th>1 course</th>
<th>2 or more courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Importance</td>
<td>140.35</td>
<td>9.85</td>
<td>144.90</td>
</tr>
</tbody>
</table>

A one-way ANOVA was conducted to evaluate the relationship between technology-related graduate course work and the perceived importance on technology leadership. The independent variable, graduate course work in technology leadership, included three levels: no courses, one 3-hour course, two or more 3-hour courses. The dependent variable was the score for Importance on the Educational Technology for Principals Survey.

As Table 14 shows, between groups yielded a sum square of 237.508 and a mean square of 118.754. The degree of freedom for the between groups was 2, and the degree of freedom for the within groups was 97. The within groups generated a sum square of
6881.227 and a mean square of 7.029 on an $F$ test of 1.674. The ANOVA was not significant, $F(2,97) = 1.674, p = .193$. Based on the $p$ value, the researcher failed to reject the null hypothesis (i.e., there was no significant difference in perceived importance among principals with different numbers of graduate course work in technology).

Table 14

*One-Way Analyses of Variance for Effects of Prior Graduate Coursework on Importance*

<table>
<thead>
<tr>
<th>Variable and Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between-groups</td>
<td>2</td>
<td>237.508</td>
<td>118.754</td>
<td>1.674</td>
</tr>
<tr>
<td>Within-groups</td>
<td>97</td>
<td>6881.227</td>
<td>7.029</td>
<td></td>
</tr>
</tbody>
</table>

2. Among principals with different numbers of in-service workshops in technology leadership, there is no significant difference in the mean scores for the degree to which principals value educational technology on the Educational Technology for Principals Survey.

The data from Table 15 and Table 16 were used to test this second null hypothesis for question 4. A one-way ANOVA was conducted to evaluate the relationship between the number of in-service workshops in technology leadership and principals’ perceived importance of technology leadership. The independent variable, prior training in technology leadership, included four levels: no courses, one course, two courses, and three or more courses. The dependent variable was the score for self-reported proficiency on the Educational Technology for Principals Survey.

Table 15 shows the means and standard deviations used to calculate the degree of
importance respondents’ places on in-service workshops and technology leadership. Respondents who took no in-service workshops had a mean score of 145.5 with a standard deviation of 9.46. Respondents who took one course for their in-service workshop had a mean score of 137.86 with a standard deviation of 9.00. Those who took two courses in their in-service training had a mean score of 135.62 with a standard deviation of 2.91, whereas respondents who took three or more courses had a mean score of 144.82 with a standard deviation of 7.80.

Table 15

<table>
<thead>
<tr>
<th>Variable</th>
<th>No Courses</th>
<th>One Course</th>
<th>Two Courses</th>
<th>Three or More</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance</td>
<td>145.5</td>
<td>137.86</td>
<td>135.62</td>
<td>144.82</td>
</tr>
<tr>
<td></td>
<td>9.46</td>
<td>9.00</td>
<td>2.91</td>
<td>7.80</td>
</tr>
</tbody>
</table>

As the data in Table 16 shows, Importance was differentiated with a degree of freedom of 3 for between-groups and 95 for within-groups. Responses yield a sum square of 708.305 for between-groups and 6299.413 for within-groups. The mean square is 236.102 for between-groups and 66.310 for within-groups on an f test of 3.561. Based on the p value, the researcher fails to reject the null hypothesis (i.e., there is no significant difference in the degree to which principals value educational technology among principals with different numbers of in-service workshops in educational technology).
Table 16

One-Way Analysis of Variance for Effects of In-Service Workshops on Importance in Technology Leadership

<table>
<thead>
<tr>
<th>Variable and Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance</td>
<td></td>
<td>708.305</td>
<td>236.102</td>
<td>3.561</td>
</tr>
<tr>
<td>Between-groups</td>
<td>3</td>
<td>708.305</td>
<td>236.102</td>
<td></td>
</tr>
<tr>
<td>Within-groups</td>
<td>95</td>
<td>6299.413</td>
<td>66.310</td>
<td></td>
</tr>
</tbody>
</table>

Results for Research Question 5

This section summarizes the quantitative data used to address Research Question 5: What are the professional development needs in educational technology identified by the elementary school principals in Miami-Dade County, Florida? Again, the following hypothesis was tested to address this research question: There is no significant difference in the professional development needs in technology leadership as measured by the difference between the mean self-reported proficiency in educational technology scores and the scores for the degree to which principals value educational technology.

A paired-samples $t$ test was conducted to evaluate the hypothesis that principals’ levels of self-reported proficiency in technology leadership were no different than the importance they attached to technology leadership. The importance that principals’ attached to technology leadership ($M = 143.82, SD = 8.545$) on average was greater than their self-reported proficiency ($M = 131.005, SD = 10.079$). The test was significant, $t(102) = 12.571, p < .001$. 

104
Table 17

*Differences in Importance and Proficiency in Technology Leadership*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Importance</th>
<th>Proficiency</th>
<th>t (61)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Technology Leadership</td>
<td>143.82</td>
<td>8.545</td>
<td>131.005</td>
</tr>
</tbody>
</table>

*p < .001.

Table 18 identifies the difference between the self-reported proficiency and the degree of value the respondents placed on educational technology on the 31 items of the survey instrument. As the data in Table 18 show, the two highest needed items for professional development were “Identify, communicate, model, and enforce social, legal, and ethical practices to promote responsible use of technology” and “Allocate financial and human resources to ensure complete and sustained implementation of the technology plan.” The least needed item for professional development was the item, “Facilitate and support collaborative technology-enriched learning environments conducive to innovation for improved learning.”

Table 18

*Mean Differences Between Importance and Proficiency in 31 Survey Items*

<table>
<thead>
<tr>
<th>Item</th>
<th>Perceived importance</th>
<th>Self-identified proficiency</th>
<th>Mean differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>28. Identify, communicate, model, and enforce social, legal, and ethical practices to promote responsible use of technology.</td>
<td>4.75</td>
<td>3.94</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Value 1</td>
<td>Value 2</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>20.</td>
<td>Allocate financial and human resources to ensure complete and sustained implementation of the technology plan.</td>
<td>4.63</td>
<td>3.82</td>
</tr>
<tr>
<td>17.</td>
<td>Use technology to advance organizational improvement.</td>
<td>4.80</td>
<td>4.05</td>
</tr>
<tr>
<td>15.</td>
<td>Engage in sustained, job-related professional learning using technology resources.</td>
<td>4.73</td>
<td>4.04</td>
</tr>
<tr>
<td>31.</td>
<td>Participate in the development of policies that clearly enforce copyright law and assign ownership of intellectual property developed with school district resources.</td>
<td>4.67</td>
<td>4.00</td>
</tr>
<tr>
<td>3.</td>
<td>Foster and nurture a culture of responsible, risk-taking and advocate policies promoting continuous innovation with technology.</td>
<td>4.72</td>
<td>4.14</td>
</tr>
<tr>
<td>11.</td>
<td>Provide for and ensure that faculty and staff take advantage of quality professional learning opportunities for improved learning and teaching with technology.</td>
<td>4.60</td>
<td>4.03</td>
</tr>
<tr>
<td>21.</td>
<td>Integrate strategic plans, technology plans, and other improvement plans and policies to align efforts and leverage resources.</td>
<td>4.56</td>
<td>4.00</td>
</tr>
<tr>
<td>22.</td>
<td>Implement procedures to drive continuous improvements of technology systems and to support technology replacement cycles.</td>
<td>4.52</td>
<td>3.98</td>
</tr>
<tr>
<td>4.</td>
<td>Use data in making leadership decisions.</td>
<td>4.78</td>
<td>4.25</td>
</tr>
</tbody>
</table>
2. Maintain inclusive and cohesive process to develop, implement, monitor a dynamic, long-range, and systemic technology plan to achieve the vision.  

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>4.58</td>
<td>4.06</td>
<td>0.52</td>
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<tbody>
<tr>
<td>4.70</td>
<td>4.20</td>
<td>0.50</td>
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18. Develop, implement, and monitor policies and guidelines to ensure compatibility of technologies.  

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<tbody>
<tr>
<td>4.46</td>
<td>3.97</td>
<td>0.49</td>
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19. Allocate financial and human resources to ensure complete and sustained implementation of the technology plan.  

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<tr>
<td>4.64</td>
<td>4.17</td>
<td>0.47</td>
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7. Identify, use, evaluate, and promote appropriate technologies to enhance and support instruction and standards-based curriculum leading to high levels of student achievement.  

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<tbody>
<tr>
<td>4.67</td>
<td>4.21</td>
<td>0.46</td>
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25. Assess staff knowledge, skills, and performance in using technology and use results to facilitate quality professional development and to inform personal decisions.  

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<tbody>
<tr>
<td>4.66</td>
<td>4.24</td>
<td>0.42</td>
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26. Use technology to assess, evaluate, and manage administrative and operational systems.  

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<tbody>
<tr>
<td>4.62</td>
<td>4.21</td>
<td>0.41</td>
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</table>

1. Facilitate shared development by all stakeholders of a vision for technology use and widely communicate that vision.  

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<tbody>
<tr>
<td>4.63</td>
<td>4.23</td>
<td>0.40</td>
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</table>

6. Advocate, on the state and national levels, for policies, programs, and funding opportunities that support implementation of the school district technology plan.  

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<tbody>
<tr>
<td>4.41</td>
<td>4.02</td>
<td>0.39</td>
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</table>
|   |                                                                                                      | Mean 1 | Mean 2 | SD  
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<tbody>
<tr>
<td>5.</td>
<td>Advocate for research based effective practices in use of technology.</td>
<td>4.66</td>
<td>4.27</td>
<td>0.39</td>
</tr>
<tr>
<td>30.</td>
<td>Promote and enforce environmentally safe and healthy practices in the use of technology.</td>
<td>4.66</td>
<td>4.31</td>
<td>0.35</td>
</tr>
<tr>
<td>9.</td>
<td>Provide for learner-centered environments that use technology to meet the individual and diverse needs of learners.</td>
<td>4.71</td>
<td>4.39</td>
<td>0.32</td>
</tr>
<tr>
<td>23.</td>
<td>Use multiple methods to assess and evaluate appropriate uses of technology resources for learning, communication, and productivity.</td>
<td>4.66</td>
<td>4.36</td>
<td>0.31</td>
</tr>
<tr>
<td>24.</td>
<td>Use technology to collect and analyze data, interpret results, and communicate findings to improve instructional practice and student learning.</td>
<td>4.84</td>
<td>4.57</td>
<td>0.27</td>
</tr>
<tr>
<td>29.</td>
<td>Promote and enforce privacy, security, and online safety related to use of technology.</td>
<td>4.71</td>
<td>4.45</td>
<td>0.26</td>
</tr>
<tr>
<td>10.</td>
<td>Facilitate the use of technologies to support and enhance instructional methods that develop higher level thinking, decision making, and problem-solving skills.</td>
<td>4.58</td>
<td>4.36</td>
<td>0.22</td>
</tr>
<tr>
<td>12.</td>
<td>Model the routine, intentional, and effect use of technology.</td>
<td>4.50</td>
<td>4.29</td>
<td>0.20</td>
</tr>
<tr>
<td>14.</td>
<td>Create and participate in learning communities that stimulate, nurture, and support faculty and staff in using technology for improved productivity.</td>
<td>4.56</td>
<td>4.38</td>
<td>0.18</td>
</tr>
</tbody>
</table>
27. Ensure equity of access to technology resources that enable and empower all learners and educators.  

13. Employ technology for communication and collaboration among colleagues, staff, parents, students, and the larger community.  

8. Facilitate and support collaborative technology-enriched learning environments conducive to innovation for improved learning.  

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Median</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>27. Ensure equity of access to technology resources that enable and</td>
<td>4.66</td>
<td>4.50</td>
<td>0.16</td>
</tr>
<tr>
<td>empower all learners and educators.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Employ technology for communication and collaboration among</td>
<td>4.85</td>
<td>4.71</td>
<td>0.15</td>
</tr>
<tr>
<td>colleagues, staff, parents, students, and the larger community.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Facilitate and support collaborative technology-enriched learning</td>
<td>4.51</td>
<td>4.56</td>
<td>-0.05</td>
</tr>
<tr>
<td>environments conducive to innovation for improved learning.</td>
<td></td>
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</tbody>
</table>

**Summary**

This chapter presented data analysis and results from the Educational Technology for Principals Survey collected from the population of elementary public school principals from a large school district in Miami-Dade, Florida. One hundred and three principals participated in this study, which represented a 54% of response rate. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to analyze the data statistically. One-way ANOVA tests and a t-test were used to test the hypotheses involved in this study. The following chapter presents the findings, discusses and interprets the results, and provides possible implications for practice and future research based on the study.
Chapter 5: Discussion and Implications

This chapter interprets the results identified from the previous chapter and discusses the implications for practice and future research. The purpose of this study is to evaluate the self-reported proficiency level and the degree of value that principals placed on technology leadership. The survey instrument is based on the NETS-A that consists of six areas, including (a) Leadership and Vision; (b) Learning and Teaching; (c) Productivity and Professional Practice; (d) Support, Management, and Operations; (e) Assessment and Evaluation; and (f) Social, Legal, and Ethical Issues.

The intention is for the feedback to be used to inform the Miami-Dade School District of the necessary professional development needed as indicated by the principals in their self-reported responses. Results are deemed to provide suggestions to educational leadership preparation programs and state and school district-level professional development in technology leadership. For each question, conclusions are drawn based on study results. Implications for practice are discussed. Relevant limitations of this study are discussed, and its implications for future research directions are suggested.

Findings and Discussion for Research Question 1

Research Question 1 asks: what are the self-reported proficiency levels of Miami-Dade County’s elementary public school principals in educational technology?

Findings. The quantitative data for Research Question 1 reveals that the sample of principals rated Productivity and Professional Practice as the most proficient among the six areas of technology leadership with a mean of 26.0. Most of the indicators in this area had consistently high mean scores with Item 13, “Employ technology for communication and collaboration among colleagues, staff, parents, students, and the
larger community,” getting the highest mean score out of the total of 31 items. The second most proficient area is Leadership and Vision with a mean of 24.9 followed by the third most proficient area of Learning and Teaching with a mean of 22.0. The area of Social, Legal, and Ethical Issues is the fourth proficient area with a mean of 21.2. Results also reveal that principals are least proficient in the areas of Assessment and Evaluation and Support, Management, and Operations with both having means of 20.0. In the area of Support, Management, and Operations, Item 20, “Allocate financial and human resources to ensure complete and sustained implementation of the technology plan,” got the lowest mean score of 3.82 out of 31 items.

**Discussion.** This finding reflects the elementary public school principals in Miami-Dade County are most proficient in applying technology to enhance their professional practice and to increase their own productivity and that of others; however, they are low proficient in support, management, and operations of technology in schools and in using technology to plan and implement comprehensive systems of effective assessment and evaluation. The results are not surprising. As discussed previously in chapter 2, the universities in south Florida that offered school administrators preparation programs usually provided a three-credit course that focused on technology skills. Graduates from these programs are normally equipped with the technology skills in handling the commonly used computer applications for daily productivity and communication. On the same token, other areas, especially support, management, and operations; technology-based assessment; and evaluation and data-driven decision making are rarely addressed in these graduate courses. Besides, Miami-Dade County Public Schools as the fourth largest school district in the nation is equipped with a
dedicated Technology Department with two offices: Information Technology Services and Instructional Technology. Both offices are responsible for handling most of the responsibilities and tasks under the area of Support, Management, and Operations, (e.g., develop, implement, and monitor policies and guidelines to ensure compatibility of technologies; allocate financial and human resources to ensure complete and sustained implementation of the technology plan; and implement procedures to drive continuous improvement of technology systems and to support technology replacement cycles). School principals are not expected to handle these tasks, which result in their low proficiency in this area.

**Findings and Discussion for Research Question 2**

Research Question 2 asks: to what degree do Miami-Dade elementary school principals value educational technology?

**Findings.** The means for the degree of Importance the sample placed on the six areas of technology leadership reveal different rankings from that for Self-Reported Proficiency. Respondents place the highest importance in the area of Leadership and Vision with a mean of 27.8. Social, Legal, and Ethical Issues is rated the second most important area with a mean of 23.4 followed by Learning and Teaching with a mean of 23.0. The area of Support, Management, and Operations, which is rated as the least proficient in Research Question 1, ranks as fourth important followed by the area of Productivity and Professional Practice with a mean of 21.1. Similar to their response to Self-Reported Proficiency, respondents rated Assessment and Evaluation as the lowest area that they perceive to be important with a mean of 18.7.

**Discussion.** The elementary public school principals in Miami-Dade County
ranked Leadership and Vision as the most important area in technology leadership. Considering their self-reported proficiency on the same area (the second most proficient), it appears that the elementary principals in Miami-Dade County are very well aware of the importance of leadership and vision in promoting technology-enhanced education in K-12 and had been trained in this area. In fact, in recognition of the critical role of technology in education, the Miami-Dade County Public School System developed a comprehensive information technology plan, entitled Miami-Dade Information Technology Blueprint, in which school leaders’ vision and leadership in technology integration is emphasized.

The Social, Legal, and Ethical Issues rank as the second most important area with a mean of 23.4. This result reflects the enforced implementation of Acceptable Use Policy and Internet Guidelines in Miami-Dade County Public Schools due to the federal law, the *Children’s Internet Protection Act*.

Similar to their response to Self-Reported Proficiency, respondents rate Assessment and Evaluation as the lowest area that they perceived to be important with a mean of 18.7. This finding is not surprising. This standard required that educational leaders use technology to plan and implement comprehensive systems of effective assessment and evaluation; however, in the state of Florida, the *Florida Comprehensive Assessment Test*, as a high-stakes, statewide standardized test, is planned and administered by a dedicated office, the Office of Assessment. School principles are usually not required to handle these tasks, which result in their low proficiency in this area as well as no need for professional development.
Findings and Discussion for Research Question 3

Research Question 3 asks: are the self-reported proficiency levels associated with Miami-Dade County elementary school principals’ training in educational technology (i.e., the number of technology-related graduate courses or in-service workshops)?

Findings. No significant differences are found in the mean scores of self-reported proficiency on the Educational Technology for Principals Survey among principals with different numbers of technology-related graduate courses. Similarly, no significant differences are found in the mean scores of self-reported proficiency on the Educational Technology for Principals Survey among principals with different numbers of in-service training and workshops in technology leadership.

Findings and Discussion for Research Question 4

Research Question 4 asks: is the degree to which principals value educational technology associated with their training in educational technology (i.e., the number of graduate courses or in-service workshops)?

Findings. The quantitative data reveals that no significant differences are found in the mean scores for the degree to which principals valued educational technology on the Educational Technology for Principals Survey among principals with different numbers of graduate courses in technology leadership. Also, no significant differences are found among principals with different numbers of in-service training and workshops.

Discussion. Research Questions 3 and 4 are combined here for the discussion because both tests of the null hypotheses found no significant differences between the principals with and those without prior training in educational technology and technology leadership. These findings suggest that the numbers of technology-related graduate
courses in the university preparation programs for school administrators’ and principals’
in-service training do not appear to affect principals’ self-reported proficiency in
technology leadership. This result might be partially explained by the content and quality
of the technology-related graduate courses offered by the educational administration
programs in south Florida and the in-service training on educational leadership. As
discussed in chapter 2, the technology-related graduate courses in the university
preparation programs for school administrators in south Florida focused mainly on the
technology skills in handling the commonly used computer applications for daily
productivity and communication that resulted in the principals’ self-reported highest
proficiency in the area of Productivity and Professional Practice. For those principals
who took no courses or in-service training in this nature, they may be able to pick up and
catch up with the technology skills through their daily work by using word-processing,
presentation, and communication tools. Most of these courses ignore the other five areas
of technology leadership as specified in the NETS-A with the exception of the courses
offered at St. Thomas University and Florida International University. Similarly, the
educational leadership in-service training offered to Miami-Dade County principals did
not appear to provide comprehensive professional development on technology leadership
that addressed all six areas in technology leadership, which resulted in no difference in
the sample’s proficiency and perception of technology leadership between those who had
and those who had not participated in the school district training.

Findings and Discussion for Research Question 5

Research Question 5 ask: what are the professional development needs in
educational technology identified by the elementary public school principals in Miami-
Findings. To address this research question, the difference in the mean score between Importance and Actual Proficiency in the six areas on the survey are used to find out the professional development needs of the principals. The paired-sample $t$ test revealed significant differences between Importance and Actual Proficiency ratings on all six areas of the standard, which suggest that principals’ statistically significant need for further training in all six areas of the NETS-A. The data further reveal that the principals’ biggest gap, resulting in the highest professional development need, is in the area of Leadership and Vision with a mean difference of 2.9. The mean score difference between the Importance and Actual Proficiency pair of Support, Management, and Operations is 2.8, making it the second highest need area followed by the area of Social, Legal, and Ethical Issues with a mean difference of 2.2, making it the third highest need area. The mean score difference for the area of Teaching and Learning is 1.5, making it the fourth need area followed by the areas of Assessment and Evaluation and Productivity and Professional Practice.

Discussion. These findings are expected. As discussed in chapter 2, the technology-related graduate courses offered by the university preparation programs for school administrators in south Florida focused solely on the basic technology skills, leaving many critical components of technology leadership untouched. Similarly, the state and school district-level leadership training rarely addressed the issue of technology leadership to the extent that will prepare school principals to meet the national standards. As reported in the data, although principals are well aware of the importance of vision, technology planning, and the need for technology integration in the classrooms, they are
not well-trained to the level of proficient in implementing and modeling the standards.

**Implications for Practice**

The results of the study have significant implications for a variety of audiences, including university preparation programs for educational administrators, state, and school district offices for professional development in educational leadership, and state and school district school administrators’ certification organization.

The NETS-A is a “national consensus among educational stakeholders of what best indicates effective school leadership for comprehensive and appropriate use of technology in schools” (ISTE, 2002, p. 1). Principals who participated in this study highly valued these standards and rated themselves as having professional development needs in most areas of the standards, especially in Leadership and Vision; Support, Management, and Operations; and Social, Legal, and Ethical Issues. The implication is very clear for university preparation programs for school administrators that the graduate course in technology leadership needs to be updated and aligned to the NETS-A. The six areas of the standards need to be addressed in the course content, and some types of assessment activities need to be designed to measure future and practicing school administrators’ mastery of the knowledge and skills in the six areas.

At the same time, the state and school district professional development offices need to provide practicing principals the opportunities for ongoing professional development based on their individual needs as they relate to the NETS-A. Needs assessment of principals in technology leadership should be conducted on a regular base to identify and update the state and school district professional development agenda. In addition, the state certification bodies for school administrators should make certain that
the future and practicing school principals are proficient in all areas of technology leadership. The most current version of Florida principal leadership standards contains the technology component that states that “High-performing leaders plan and implement the integration of technological and electronic tools in teaching, learning, management, research, and communication responsibilities” (Florida Department of Education, 2006, p. 1). Obviously, this one-sentence standard leaves many areas in technology leadership untouched. Although the Florida Department of Education adopted the National Educational Technology Standards for Students and Teachers, it is still among the few states that have not yet adopted the NETS-A. For school leaders in Florida to be competent leaders for the 21st century, it is imperative that Florida Department of Education update the educational leadership standards by ensuring all future and practicing principals competent in all areas of technology leadership.

Implications for Future Research

This study identified the current proficiency levels of Miami-Dade public elementary school principals in the six areas of technology leadership as well as the needed areas for professional development, the purpose of which is to prepare school leaders better for the 21st-century education. Because research on the best ways to prepare, train, and develop highly qualified school leaders in technology leadership is sparse (Hallinger & Leithwood, 1996), further research should be conducted on principal views regarding technology leadership needs and interests in an effort to equip them with essential skills, resources, and tools for the many aspects of the job today. The results of the study suggested the following three major needed areas for future research on this topic:
1. The study involves the nation’s fourth largest school district, which is also one of the most culturally diversified school district in this country regarding students, faculty, staff, and school leaders. As the data about the participants demographics revealed, most of the elementary school principals in Miami-Dade are African American females with master’s degrees in educational leadership. Additional studies are needed to investigate different types of school districts in Florida (e.g., small school districts such as Wakulla County School District in the Panhandle part of Florida, rural school districts such as Monroe County School District, and White-dominated school districts such as Jackson School District). It would be also interesting to investigate if any differences exist between female and male elementary school principals regarding their perceptions, proficiency, and professional development needs in technology leadership.

2. The study found that there were no significant differences between elementary school principals with or without prior training in educational technology (i.e., technology-related graduate courses and in-service workshops in technology leadership) on their proficiency, perceptions, and interests in technology leadership, which is in contradiction to common sense. Although the response rate is relatively high in this type of academic survey involving school leaders (54%), the target 172 sample size was not obtained and the insufficient sample size may have contributed to insufficient statistical power, and there is a very large probability that Type II error was committed. Future studies with a large sample size that satisfy the 95% confidence level may find significant differences in the proficiency, perceptions, and needs for professional development in technology leadership of the principals with different levels of prior training in educational technology.
3. The study relied solely on a 31-item survey and quantitative data analysis that involved mean, standard deviation, and one-way ANOVA tests. Due to the involving nature of educational technology, the multiple roles a school principal needs to fulfill and the complexity of the school culture, qualitative research methods such as in-depth interviews, on-site observations, and case analysis may help to gain a more accurate and deeper understanding of school principals’ proficiency, perceptions, and needs in educational leadership. The researcher of this study suggests a mixed-method quantitative and qualitative study on this topic to investigate further how best to meet school principals’ professional development needs in technology leadership and what the obstacles are that they are facing to implement technology leadership in their schools.

Based on the three major areas that are needed for future study, the researcher suggests the following specific research questions that researchers concerned with the professional development of principals in the area of technology leadership may find worth pursuing:

1. Would similar results be revealed if the same study had been conducted in different types of schools (small and rural) with different demographics of school principals (i.e., White male vs. African American female)?

2. Would similar results be revealed if the same study had been conducted with superintendents and other school district-level administrators?

3. Would similar results be revealed if the same study had been conducted in counties in different regions of Florida such as school districts in the Gulf Coast, central Florida, or north Florida?

4. Would other groups such as middle or high school principals place similar
Actual Proficiency and Importance on technology leadership?

5. Would a qualitative study reveal additional information regarding the principals’ technology leadership?

6. Would a follow-up study with the same sample reveal significant improvement in the areas identified in this study in 3 to 5 years?

7. Would a larger sample size yield different results from that of this study?

8. What is the content of current professional development offerings for principals related to technology leadership inside and outside the local school district?

9. How are other school districts engaging principals in professional development related to technology leadership?

It is hoped that this study will contribute to a better understanding of the current technology leadership proficiency and needs of practicing principals in the Miami-Dade County Public School System. The study also provides an eye-opener on the overall assessment of the professional development needs of Miami-Dade County elementary school principals in the area of technology leadership. University preparation programs for school administrators in south Florida should make certain that technology leadership competencies be addressed in their programs. Technology leadership is a critical element of 21st-century educational leadership, which is the single most important factor for successful technology integration in K-12 education. It is imperative that universities, state, and school districts work together to prepare effective and highly qualified school leaders who can ensure an enhanced education through technology in the United States.
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Appendix A

Educational Technology for Principals Survey

Demographic Data

Gender: ______________________ Number of Staff in your building: _______________

Race: ______________________ Number of teachers in your building: ___________

Highest degree held: __________ Number of students in your building: ___________

Years of administrative experience: _____ School ranking of 2008-2009: ___________

Did you take any technology-related graduate courses?

☐ None ☐ one 3-hour course ☐ two or more 3-hour courses

Did you participate in any in-service training/workshops in technology leadership?

☐ None ☐ one ☐ two ☐ three or more

Survey Instructions: In the left hand column rate the “importance” of the statements relative to what principals should know and be able to do in the area of education technology. In the right hand column, rate your current “actual performance or proficiency” on each of the statements in the area of educational technology.
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<th>IMPORTANCE</th>
<th>ACTUAL PROFICIENCY</th>
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<td>Very Important</td>
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1. Facilitate shared development by all stakeholders of a vision for technology use and widely communicate that vision.

2. Maintain inclusive and cohesive process to develop, implement, monitor a dynamic, long-range, and systemic technology plan to achieve the vision.

3. Foster and nurture a culture of responsible, risk-taking and advocate policies promoting continuous innovation with technology.

4. Use Data in making leadership decisions.

5. Advocate for research based effective practices in use of technology.

6. Advocate, on the state and national levels, for policies, programs, and funding opportunities that support implementation of the district technology plan.

7. Identify, use, evaluate, and promote appropriate technologies to enhance and support instruction and standards-based curriculum leading to high levels of student achievement.
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<th><strong>8. Facilitate and support collaborative technology-enriched learning environments conducive to innovation for improved learning.</strong></th>
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<td><strong>9. Provide for learner-centered environments that use technology to meet the individual and diverse needs of learners.</strong></td>
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<td><strong>10. Facilitate the use of technologies to support and enhance instructional methods that develop higher-level thinking, decision making, and problem-solving skills.</strong></td>
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<td><strong>11. Provide for and ensure that faculty and staff take advantage of quality professional learning opportunities for improved learning and teaching with technology.</strong></td>
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<td><strong>12. Model the routine, intentional, and effective use of technology.</strong></td>
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<td><strong>13. Employ Technology for communication and collaboration among colleagues, staff, parents, students, and the larger community.</strong></td>
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<td><strong>14. Create and participate in learning communities that stimulate, nurture, and support faculty and staff in using technology for improved productivity.</strong></td>
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<td><strong>15. Engage in sustained, job-related professional learning using technology resources.</strong></td>
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<td><strong>16. Maintain awareness of emerging technologies and their potential uses in education.</strong></td>
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1. Use technology to advance organizational improvement.

2. Develop, implement, and monitor policies and guidelines to ensure compatibility of technologies.

3. Allocate financial and human resources to ensure complete and sustained implementation of the technology plan.

4. Allocate financial and human resources to ensure complete and sustained implementation of the technology plan.

5. Integrate strategic plans, technology plans, and other improvement plans and policies to align efforts and leverage resources.

6. Implement procedures to drive continuous improvements of technology systems and to support technology replacement cycles.

7. Use multiple methods to assess and evaluate appropriate uses of technology resources for learning, communication, and productivity.

8. Use technology to collect and analyze data, interpret results, and communicate findings to improve instructional practice and student learning.

9. Assess staff knowledge, skills, and performance in using technology and use results to facilitate quality professional development and to inform

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<td>26. Use technology to assess, evaluate, and manage administrative and operational systems.</td>
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<td>27. Ensure equity of access to technology resources that enable and empower all learners and educators.</td>
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<td>28. Identify, communicate, model, and enforce social, legal, and ethical practices to promote responsible use of technology.</td>
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<td>29. Promote and enforce privacy, security, and online safety related to use of technology.</td>
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<td>30. Promote and enforce environmentally safe and healthy practices in the use of technology.</td>
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<td>31. Participate in the development of policies that clearly enforce copyright law and assign ownership of intellectual property developed with district resources.</td>
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Appendix B

Request to Use Survey

Dr. James G. Allen, Chair
Educational Leadership Programs
School of Education
Antioch University McGregor
April 10, 2009

Dear Dr. James Allen,

I am currently a doctoral student at St. Thomas University in Miami Gardens, Florida. I will be conducting a study of Technology Leadership among Elementary Public School Principals in Miami-Dade County, in the State Of Florida. Therefore, I am requesting permission to use your Educational Technology for Principal’s Survey instrument that you developed in 2003. The instrument to which I refer is based on the National Educational Technology Standards for Administrators (NETS-A) and is designed to measure to what degree school principals value each of the 31 NETS-A performance indicators and the principals proficiency on each of the performance indicators. This instrument will be critical to the execution of this study. Therefore, I anxiously await your kind consideration and understanding in this matter.

Sincerely Yours,

Judith Grey
Appendix C

Permission to Use Survey From Dr. James G. Allen

Hi Judith:
You certainly have my permission to use the survey. Make sure to cite accordingly - - remember the individual questions come directly from the NETS-A standards. I believe they are in the process of being revised. You should check the ISTE website. Good luck - and keep me posted on the outcome of your research.
Jim Allen

Dr. James G. Allen
Chair
Educational Leadership Programs
School of Education
Antioch University McGregor

p (937)-769-1848
f (937-769-1805
Appendix D

Survey Letter to Principals

1899 NW 112 Street
Miami, Fl 33167
March 04, 2010

Dear Principals,

My name is Judith E. Grey of Ludlam Elementary School. I am in the process of completing my doctorate in Educational Leadership from St. Thomas University in Miami Gardens. As part of my dissertating research, I intend to use a survey to collect the appropriate data.

The title of my applied dissertation is A Study of Technology Leadership among Elementary Public School Principals in Miami-Dade County. The focus of this study is to explore the principals’ proficiency, perceptions and interest in technology leadership. I am requesting your participation in this study which has been approved by the Miami-Dade County School district (See attachment).

Procedure for Participation

As part of this study, you will be asked to participate in a survey where you will (1) share your knowledge and experience as a technology leader of your school, (2) define your role and practices as a technology leader, and (3) document the knowledge, skills, and training of principals you feel are important for technology integration to occur. The survey will take no longer than 10 minutes of your time.

Your participation in this study is strictly voluntary. The data collected during the survey will be kept private, schools and participants will remain anonymous. There is no compensation for participating in this study.

Risks and Benefits of Participating in the Study

There are no risks to participating in this study. The benefits to participation are numerous: (1) The findings will add to the base of current knowledge regarding effecting school technology leadership, (2) your participation could inform future principal training and practice at the national and local level, (3) the findings can be used at the local school district level to plan and to develop appropriate professional development that meets the
needs of current technology leadership and future school administrators. A copy of the abstract from this study will be available to you upon request.

Contacts and Questions

Judith Grey
Ludlam Elementary School
Miami, Fl 33143
239823@dadeschools.net

Thank you for your time and your willingness to participate in this survey process.

Sincerely,

Judith E. Grey
Appendix E

Approval Letter From Miami-Dade County Public Schools

Ms. Judith Evadney Grey
1899 N. W. 112th Street
Miami, FL 33167

Dear Ms. Grey:

I am pleased to inform you that the Research Review Committee of the Miami-Dade County Public Schools (MDCPS) has approved your request to conduct the study, “A Study of Technology Leadership Among Elementary Public School Principals in Miami-Dade County.” The approval is granted with the following conditions:

1. Participation of a school in the study is at the discretion of the principal. A copy of this approval letter must be presented to the principal.

2. The participation of all subjects is voluntary.

3. The anonymity and confidentiality of all subjects must be assured.

4. The study will involve approximately 300 MDCPS principals. Their participation will not exceed 15 minutes per principal.

5. Disruption of the school’s routine by the data collection activities of the study must be kept at a minimum. Data collection activities must not interfere with the district’s testing schedule.

It should be emphasized that the approval of the Research Review Committee does not constitute an endorsement of the study. It is simply a permission to request the voluntary cooperation in the study of individuals associated with the MDCPS. It is your responsibility to ensure that appropriate procedures are followed in requesting an individual’s cooperation, and that all aspects of the study are conducted in a professional manner. With regard to the latter, make certain that all documents and instruments distributed within the MDCPS as a part of the study are carefully edited.

The approval number for your study is 1562. This number should be used in all communications to clearly identify the study as approved by the Research Review Committee. The approval expires on June 30, 2010. During the approval period, the study must adhere to the design, procedures and instruments which were submitted to the Research Review Committee. If there are any changes in the study as it relates to the MDCPS, it may be necessary to resubmit your request to the committee. Failure to notify me of such a change may result in the cancellation of the approval.

Office of Program Evaluation • 1500 Biscayne Boulevard • Suite 224 • Miami, FL 33132
305-995-7529 • 305-995-2691 (FAX) • www.dadeschools.net
If you have any questions, please call me at 305-995-7529. Finally, remember to forward an abstract of the study when it is complete. On behalf of the Research Review Committee, I want to wish you every success with your study.

Sincerely,

Tarek Chebbi, Ed. D.
Chairperson
Research Review Committee

TCmp

APPROVAL NUMBER: 1562
APPROVAL EXPIRES: 06-30-10

Dear Mr. [Name],

I am pleased to inform you that the Research Review Committee of the Miami-Dade County Public School (MDCP) has approved your request to conduct the study, "A Study of Technology Integration Among Elementary School Principal's in Miami-Dade County." The approval is subject to the following conditions:

1. Participation of a subject in the study is at the discretion of the principal. A copy of this approval must be presented to the principal.

2. The participation of all subjects is voluntary.

3. The anonymity and confidentiality of all subjects must be ensured.

4. The study will involve approximately 100 MDCPS principals. Their participation will not exceed 10 minutes per principal.

Data collection and analysis must be completed within the principal's normal schedule.

It should be emphasized that the approval of the Research Review Committee does not constitute an endorsement of the study. It is simply a permission to conduct the study of individuals associated with the MDCPS. It is the responsibility of the principal to ensure that approval is obtained and that all aspects of the study are conducted in a professional manner. With regard to the latter, echo certain that all documents and instruments developed within the MDCPS as a part of the study are carefully edited.

The approval number for your study is 1562. This number should be used by all communications in which the study is approved by the Research Review Committee. The approval expires on June 30, 2010. During the approval period, the study may not affect the principal's schedule. If there are any changes in the study as it relates to the MDCPS, it may be necessary to request a new request to the committee. Failure to notify me of such a change may result in the cancellation of approval.
Appendix F

Approval Letter From Institutional Board Review

ST. THOMAS UNIVERSITY
Developing Leaders For Life

Institutional Review Board
1600 N.W. 32nd Ave., Miami, Florida 33154
Proposal Approval Form
St. Thomas University

PRINCIPAL INVESTIGATOR(S): Judith Gray-Bowen

PROJECT TITLE: A STUDY OF TECHNOLOGY LEADERSHIP AMONG ELEMENTARY SCHOOL PRINCIPALS IN MIAMI-DADE COUNTY

In accordance with St. Thomas University policy and national guidelines governing the ethical use of human participants in research, the university Institutional Review Board certifies that the above stated project:

- being exempt from full review was peer reviewed by the IRB under the expedited review process and in its original form was
- was revised according to suggestions made by the IRB to the investigators and was
- being subject to a full review by the IRB was

REVISION REQUESTED ON

APPROVED ON 03/04/2010

DISAPPROVED ON

A follow-up progress report should be submitted to the IRB by one year from the date of approval. Investigators may request continuation of a project using the IRB project submittal form and procedure.

Human Subjects are adequately informed of any risks:

Signature: Gary Tuckey, PhD
Chair, St. Thomas University IRB
Date: 03/08/10

IRB tracking # 2010-002