AN EXPLORATION OF THE RELATIONSHIP BETWEEN PRINCIPAL LEADERSHIP EFFICACY, PRINCIPAL COMPUTER SELF-EFFICACY, AND STUDENT ACHIEVEMENT

Shelia Brown, B.S., M.Ed.

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APPROVED:

Richard Fossey, Major Professor
James D. Laney, Co-Major Professor
Janelle B. Mathis, Minor Professor
Nancy Nelson, Chair, Department of Teacher Education and Administration
Jerry R. Thomas, Dean of the College of Education
Michael Monticino, Dean of the Robert B. Toulouse School of Graduate Studies

The purpose of this study was to examine whether or not relationships exist between principals’ technology proficiency and student achievement as indicated by 2008 Texas Assessment of Knowledge and Skills (TAKS) ninth grade reading scaled scores. Secondly, the study examined whether or not relationships exist between principals’ leadership self efficacy and student achievement as indicated in the 2008 Texas Assessment of Knowledge and Skills (TAKS) ninth grade reading scaled scores. Lastly, the select principal’s personal and school demographic variables (principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school economic status, school size) were considered within the study. The survey instruments used in this study were the Technology Proficiency Self Assessment Scale (TPSA) developed by Ropp in 2000 and the Principal’s Self-Efficacy Scale (PSES) developed by Tschannen-Moran and Garies in 2004. A total of 129 Texas principal’s participated in the study. Multiple regressions were utilized and effect size was considered to determine the strength of the relationship between variables. A statistical significance was found relating to the school’s social economic status only when using both the PSES and the TPSA instruments. The effect sizes reported were all moderate, which acknowledged that relationships did exist between all predictor variables tested. Based on the information provided for B weights, School’s SES was found to be the best predictor of reading TAKS achievement, preceded by Principal’s Highest Degree Earned and Gender. SPSS 16.0 was used to analyze all data. This study adds to the literature on principals’ technology efficacy and principal’s self efficacy.
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An African proverb states, “If you want to go fast, go alone; if you want to go far, go with others.” I am so very thankful for everyone who took the journey with me. Mere words cannot totally express the gratitude in my heart.

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CHAPTER 1

INTRODUCTION

Background

The nation has transitioned from an agricultural to an industrial manufacturing economy to its current state as an information-based economy. With the changes in the economy, there has also been a change in necessary essential skills of basic literacy to more advanced literacy skills such as agility, self-reliance, self-motivation, problem-solving, collaboration, and facility in using information and communication technologies (Education Technology Advisory Committee [ETAC], 2006). Technology and advanced communications have reconfigured the world into a global community where organizations are required to respond to global market expectations for consumer goods and services. The National Educational Technology Plan (NETP) calls for organizations who want to remain in the competitive market to require their personnel to acquire new technological knowledge and skills (US Department of Education, 2010)\(^1\).

A demand for new technological knowledge and skills can also be observed within the educational realm. Educators are connecting to undiscovered knowledge pools across continents, where intellectual work and intellectual capital can be readily accessed any time and in virtually any environment. The accessibility of these new knowledge pools has dramatically altered the learning and teaching environment in our nation’s classrooms (ETAC, 2006). The altering of the educational environment through the utilization of technology in the schools has created a two-fold educational effect, immediate and long-term (Palozzi & Spradlin, 2006).

Much of the altering of the educational environment has occurred due to the requirements of a portion of the federal No Child Left Behind Act (NCLB) Enhancing Education Through Technology Act (2001), also known as Title II Part D. The primary goal of this part of the act is
to improve student academic achievement through the use of technology in elementary and secondary schools. Additional goals are (a) To assist every student in crossing the digital divide by ensuring that every student is technologically literate by the time the student finishes the eighth grade, regardless of the student’s race, ethnicity, gender, family income, geographic location, or disability; and, (b) To encourage the effective integration of technology resources and systems with teacher training and curriculum development to establish research-based instructional methods that can be widely implemented as best practices by state educational agencies and local educational agencies (Department of Education, 2004). This legislative piece is financially supported by Congress which believes that educational technology has the potential to enhance student learning and increase academic achievement. In one year, 1999–2000, a projected $6 billion was allocated for educational technology to schools wanting to purchase technology that had been proven effective through empirical research. Technology funding and support has been noted since the implementation of NCLB. However, more research remains to be done in meeting national standards, utilizing technology, and improving academic achievement (Bielefeldt, 2005; Palozzi & Spradlin, 2006).

Americans are quite concerned about the quality of education that students are receiving. This concern has spurred citizens to demand that school leaders be held accountable for the outcomes of the education that they provide (Smith, Guarnio, Strom, & Reed, 2003). This concern has also pressured school leaders to increase student scores on state accountability measures. The need to fulfill the requirements of NCLB has brought a realization to principals that they must maintain a standard of proficiency and exhibit ongoing progress on high stakes tests in order to prevent parents from choosing the option to enroll their child in other schools (Smith et al., 2003). An additional added pressure for school leaders is the realization that they
must take full responsibility for ensuring school success or face the possibility of losing their leadership positions altogether.

School principals and teacher leaders have a key role in the theoretical and applicable aspects of Title II Part D section of NCLB. The behaviors of principals and school leaders are pivotal to the development and implementation of an effective teaching and learning environment within the school community (Smith et al, 2003). From a social cognitive perspective, these behaviors are what Bandura (1986) interprets as conception of reciprocal determinism, the view that (a) personal factors in the form of cognition, affect, and biological events, (b) behavior, and (c) environmental influences create interactions that result in a triadic reciprocality. Triadic reciprocality is a theoretical framework that classifies student characteristic variables in three dimensions: personal learning characteristics, environmental factors, and personal learning behaviors. The variables interact with each other causing an impact on the learner (Bandura, 1986).

The social cognitive theory encompasses self-efficacy. Self-efficacy is a personal factor (p) that can have a great effect upon human agency (Pajares, 2002). Bandura (1997) delineates self-efficacy as “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (p. 3). “Self-efficacy beliefs determine how people feel, think, motivate themselves, and behave” (Bandura, 1994, p.1). “Self-efficacy is, therefore, an important construct useful for understanding a broad spectrum of human behavior in various social contexts” (Smith et al., 2003).

Statement of the Problem

The world of education is being driven by the “new realities of the digital marketplace
(p.10), the fast-paced expansion of “virtual” schools (p.10), and the enthusiasm of students, also known as digital natives, who are weaned on the marvels of technology and are actually pressuring our schools to adapt and change in ways never before imagined” (ETAC, 2006).

In 2001, India graduated almost a million more students from college than the United States did. China graduates twice as many students with bachelor’s degrees as the U.S. and they have six times as many graduates majoring in engineering. (Friedman, 2006)

According to the Educational Technology Advisory Committee (2006), state leaders and educators must work with a sense of urgency in identifying and meeting current and future challenges that may prevent educational and economic progress of Texas students and students across the United States. With this call for urgency, the main goal of teaching and learning is to empower students to live and learn in an ever-changing global environment by providing direction, equitable access, and resources in technology.

To enhance educational and economic progress of students, Hess (2006) believes that educational institutions must utilize technology in the same manner as business and government do, with the key focus of optimal use, which leads to increased productivity, which results in enhanced student achievement. Hess (2006) purports that technology can serve as a conduit to streamline both educational processes and data management. For example, data management programs can more readily assist educators in more proficient record keeping of student achievement outcomes.

Several of today’s students are highly technology savvy, due to exposure to educational technologies such as computers, software, Internet access, digital textbooks, electronic whiteboards, video conferencing, and online courses (ETAC, 2006; Palozzi & Spradlin, 2006). Today’s students believe that technology is valuable and use technology in many facets of their lives. Therefore, in order to support student beliefs, learning, and achievement, it is imperative
that resources, especially qualified technology-erudite personnel, are provided in schools. Erudite school personnel include principals and teachers who possess high levels of self-efficacy, and supply instructional leadership practices that enable them to meet the challenge of being accountable for raising test scores, reducing the number of dropouts, and narrowing the achievement gap that separates white and minority students (Archer, 2004; Duke, 2004). DiPaola and Tschannen (2003) believe that principal’s leadership is so important and that without leadership students cannot achieve. The leadership support of principals and teachers can provide students with the opportunity to succeed in an inclusive labor force with changing economic implications (ETAC, 2006).

Beyond the support of principals and teachers for computer technology literacy, several professional and governmental agencies, such as the International Society of Technology Education (ISTE), have established accountability standards for technology leadership (Diehl, 2005). ISTE’s National Educational Technology Standards (NETS) have served as a blueprint since 1998 for improved teaching and learning by educators. ISTE standards for students, teachers and administrators help to measure proficiency and set goals for knowledge, skills, and attitudes needed to succeed in today’s digital age (ISTE, 2008). National Educational Technology Standards for Administrators (NETS-A) are indicators of effective leadership for technology in schools. The NETS-A strands are as follows:

I. Leadership and Vision
II. Learning and Teaching
III. Productivity and Professional Practice
IV. Support, Management, and Operations
V. Assessment and Evaluation
VI. Social, Legal, and Ethical Issues
The NETS-A strand, Learning and Teaching, states that educational leaders ensure that curricular design, instructional strategies, and learning environments integrate appropriate technologies to maximize learning and teaching. Educational leaders:

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

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

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

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

E. Provide for and ensure that faculty and staff take advantage of high-quality professional learning opportunities for improved learning and teaching with technology. (ISTE, 2008)

Purpose of the Study

The purpose of this study was to examine whether relationships exist between principals’ technology proficiency and student achievement as indicated in the Texas Assessment of Knowledge and Skills (TAKS) ninth-grade reading scaled scores. Secondly, the study examined whether relationships exist between principals’ leadership self-efficacy and student achievement as indicated in the Texas Assessment of Knowledge and Skills (TAKS) ninth-grade reading scaled scores. Lastly, the select principals’ personal and school demographic variables were
considered within the study. This study adds to the literature on principals’ technology efficacy and principals’ self-efficacy.

Research Questions and Hypotheses

1. Is there a relationship between principals’ technology proficiency, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?

H0 1.1 There will be no relationship between principals’ scores on the World Wide Web subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 1.2 There will be no relationship between principals’ scores on the Teaching with Technology subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 1.3 There will be no relationship between principals’ scores on the Integrated Applications subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school
socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 1.4 There will be no relationship between principals’ scores on the Email subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

2. Is there a relationship between principals’ self-efficacy, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?

H0 2.1 There will be no relationship between principals’ scores on the Moral Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 2.2 There will be no relationship between principals’ scores on the Management Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.
H0 2.3  There will be no relationship between principals’ scores on the Instructional Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

Significance of the Study

This research study was conducted to add to the base of literature that addresses the following: 1) principals’ leadership self-efficacy, 2) principals’ technology proficiency, which is also known as technology self-efficacy, 3) principals’ select demographic characteristics, and 4) student achievement. There have been several research studies that reflect the positive impact that a teacher’s level of self-efficacy has on student achievement (Jackson, 1997). However, in the review of literature, research in the area of principals’ self-efficacy and the impact that it has had on student achievement has not been addressed to the same degree. Tschannen-Moran and Gareis (2004) declared,

The study of principals’ self-efficacy beliefs is a promising new line of research. Both antecedents to a robust sense of efficacy, as well as the outcomes related to strong efficacy beliefs of school leaders are likely to be fruitful avenues of study. (p. 583)

Tech-savvy administrators that exercise a vision embracing technology often determine if proficient amounts of technology are implemented by students and teachers to reach the academic goal of student achievement (Holland, 2000). Just as there is limited research about principals and self-efficacy, the same premise holds true to the limited amount of research related to principals’ leadership in technology usage (Moses, 2006). The information in this research can
be used by school districts, universities, education service centers, education agencies, and educational leadership organizations to make informed decisions regarding technology funding and infrastructure, the implementation of technology that enhances teaching and learning of students, teachers and administrators, and staff development training geared to support student achievement.

Overview of the Methodology

This study was a predictor study utilizing a multiple regression method, which is a part of the general linear model. Two surveys were used in this research study: the Principal’s Sense of Efficacy Scale (PSES) (Tschannen-Moran & Gareis, 2004) and the Technology Proficiency Self Assessment (TPSA) (Ropp, 1999). The PSES assesses principal’s capabilities in the areas of instructional leadership, management leadership, and moral leadership. The TPSA is a self assessment instrument that rates an individual’s confidence in utilizing technology related skills (Knezek, Christensen, Miyashita, & Ropp, 2000).

The participants in the study were 129 high school principals from Texas high schools with student populations that included ninth graders. The minimum number of participants was established using cases to IVs ratio. The required sample size was dependent on a number of issues including the desired power, alpha level, number of predictors, and expected effect sizes (Tabachnick and Fidell, 2007, p. 123). Permission to conduct the study was made through school superintendents or principals in districts across the state of Texas. The participants received surveys via Survey Monkey.
Limitations

The methodology of this study was restricted by the following factors:

1. The study was limited to administrators who were randomly selected and responded to the survey electronically.
2. Data was collected from randomly selected administrators in the State of Texas.
3. The Texas Assessment of Knowledge and Skills (TAKS) scaled reading scores of ninth graders was limited to one grade level.

Delimitations

The following delimitations applied to this study indicate potential boundaries and/or ways in which the findings may lack generalizability.

1. The sample population was comprised of administrators in the State of Texas.
2. The study assessed technology self-efficacy skills of Texas principals only.
3. The study assessed self-efficacy skills of Texas administrators only.
4. The study assessed direct and indirect principal leadership characteristics of Texas administrators only.

Definition of Key Terms

The following definitions were used for the purpose of this study:

- Demographic variables – also known as contextual variables.
- Efficacy expectation – “An efficacy expectation is the individual’s conviction that he or she can orchestrate the necessary actions to perform a given task, while outcome expectancy is
the individual’s estimate of the likely consequences of performing that task at the expected level of competence” (Bandura, 1986).

- **Efficacy, self-efficacy and sense of efficacy** – Used congruently to describe one’s judgments of their capabilities to organize and execute courses of action required to achieve specified types of performances (Bandura, 1986).

- **No Child Left Behind Act of 2001** – The No Child Left Behind Act of 2001 (NCLB) reauthorized the Elementary and Secondary Education Act (ESEA)—the main federal law affecting education from kindergarten through high school. Proposed by President Bush shortly after his inauguration, NCLB was signed into law on January 8, 2002. NCLB is built on four principles: accountability for results, more choices for parents, greater local control and flexibility, and an emphasis on doing what works based on scientific research (U.S. Department of Education).

- **Principal’s Sense of Efficacy Scale (PSES)** – Principal’s Self-Efficacy Belief is the belief in their capability to make a difference in the schools they lead and to effectively manage the challenges they face. The Principal’s Sense of Efficacy Scale asks principals to assess their capabilities concerning instructional leadership, management, and moral leadership (Tschannen-Moran & Gareis, 2004).

- **Social cognitive theory** – Social cognitive theory postulates that human functioning is determined by (a) personal factors in the form of cognition, affect, and biological events, (b) behavior, and (c) environmental influences (Bandura, 1986).

- **Technology Proficiency Self Assessment (TPSA)** – An assessment used as a self-efficacy tool in which participants rate their own confidence in performance of a technology related task
The TPSA consists of four measurement scales (email, integrated applications, teaching with technology, and World Wide Web).

- Texas Assessment of Knowledge and Skills (TAKS) – The Texas public school accountability system to rate school districts and evaluate campuses.

Summary

This chapter was dedicated to offer a brief synopsis of this research study which examines whether relationships exists between principals’ self-efficacy, principals’ technology self-efficacy, select personal and school demographic characteristics, and student achievement. For this study, student achievement was measured by Texas Assessment of Knowledge and Skills reading scaled scores. This chapter provided a brief introduction, discussed the purpose and significance of the study, and identified key questions and hypotheses that were explored within the contents of this study. A short overview of the methodology within this research study was highlighted noting limitations, delimitations and definition of terms.

Chapter 2 reviews relevant literature pertaining to this field of study. It will then examine the social cognitive theory which encompasses self-efficacy, as well as provide a detailed assessment of the literature pertaining to self-efficacy as it relates to technology use, principal leadership, and student achievement in reading and other aspects of education.
CHAPTER 2
REVIEW OF LITERATURE

Introduction

This chapter provides a review of current literature devoted to the study of principal’s technology self-efficacy, self-efficacy, select personal and school demographic characteristics, student achievement and how these subjects interrelate. The purpose of this study was to explore the relationships between Texas high school principals’ leadership characteristics (self-efficacy), Texas high school principals’ technology self-efficacy, select principals’ personal and school demographics, and whether these factors impact Texas ninth-grade students’ reading achievement as measured by the Texas Assessment of Knowledge and Skills (TAKS) reading scaled score results. In this paper, usage of the terms technology and computer are interchangeable.

Two research questions guided this study. Each hypothesis is addressed in order.

Research Question 1: Is there a relationship between principals’ technology proficiency, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?

H0 1.1 There will be no relationship between principals’ scores on the World Wide Web subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.
H0 1.2  There will be no relationship between principals’ scores on the Teaching with Technology subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 1.3  There will be no relationship between principals’ scores on the Integrated Applications subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 1.4  There will be no relationship between principals’ scores on the Email subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, TAKS ninth-grade reading scaled scores of students from select Texas high schools.

Research Question 2: Is there a relationship between principals’ self-efficacy, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?

H0 2.1  There will be no relationship between principals’ scores on the Moral Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of...
experience as a professional, total years as principal at current school, total years of
principal experience, highest degree earned, school socioeconomic status, school
size, and TAKS ninth-grade reading scaled scores of students from select Texas
high schools.

H0 2.2 There will be no relationship between principals’ scores on the Management
Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total
years of experience as a professional, total years as principal at current school, total
years of principal experience, highest degree earned, school socioeconomic status,
school size, and TAKS ninth-grade reading scaled scores of students from select
Texas high schools.

H0 2.3 There will be no relationship between principals’ scores on the Instructional
Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total
years of experience as a professional, total years as principal at current school, total
years of principal experience, highest degree earned, school socioeconomic status,
school size, and TAKS ninth-grade reading scaled scores of students from select
Texas high schools.

This chapter begins by introducing the components of leadership, and the personal and
school contextual variables which impact its effectiveness. It then goes on to explain the
historical background of self-efficacy and the social cognitive theory in which it lies. The latter
portion of this chapter reviews literature which has researched the impact of teacher self-
efficacy, computer self-efficacy, and technology in education.
Principal Leadership

This section discusses three dimensions of leadership consisting of instructional, management, and moral leadership. The focus of an effective leader should include these three dimensions of principal leadership (Lehman, 2007). Later in Chapter 3 with the survey instrument, these three types of leadership serve as subscales within the Principals’ Sense of Efficacy Scale.

In The Elements of Leadership, Noonan (2003) describes leadership as “developing potential and building community” (p. 3). Maxwell (2000) characterizes leadership as influence. Lloyd and Maher (1993) document leadership as “the process of being perceived as a leader” (p.11). Fullan (2002) believes that effective school leaders are crucial to large-scale, sustainable education reform. Effective leaders have a more in-depth and more sustainable influence on organizations and provide more inclusive leadership if their focus extends beyond maintaining high standards.

Instructional leadership can simply be defined as “anything that leaders do to improve teaching and learning in their schools and districts” (King, 2002). The implication in this definition is that leadership may have a different view from one learning community to the next. As principals are faced with numerous challenges, an effective instructional leader must consistently keep focus on improving teaching and learning, and documenting measurable increases in achievement (King, 2002). Instructional leadership involves, but is not limited to, leading learning, developing leadership capacity, creating conditions for professional learning communities, using data to make informed decisions, and using resources creatively (King, 2002). The second dimension of leadership noted is management leadership. Management leadership relates to supporting implementation through resource management and encompasses
factors that support the principal’s ability to implement practices that establish and maintain a caring and supportive teaching environment. Lastly, a third dimension of leadership is moral leadership. Moral leadership focuses on the values and ethics of the leaders themselves (Leithwood and Duke, 1998).

Principal Personal Characteristics and School Contextual Variables

The position of principal can be one of many challenges. The position often involves itself to a demanding level of stress, constant criticism, and a monopolization of one’s personal time for the sake of the educational profession. The demands are even greater when contextual variables that impact the process of school leadership are considered (Jacobson & Conway, 1995). Personal, organizational, social, and environmental factors often influence the dynamics of the educational environment and decisions that principals make regarding the school (Creefield, 1987). The principal’s characteristics and other contextual variables discussed in the next section are gender, experience, highest degree earned, and school socioeconomic status.

Gender

A principal’s gender is a personal characteristic that correlates with a principal’s actions and other personal characteristics. Research suggested that female principals are more actively
engaged in the instructional process than their male counterparts. Leithwood (1988) purports that:

the socialization experiences of men and women [are linked] with differences in career aspirations and view of the principal’s role. Such experiences appear to cause more men to seek the principalship earlier in their careers (before age 30) and to aspire to the superintendency as a career move. Gender related socialization experiences also seemed to contribute to a relatively large proportion of women viewing themselves more as curriculum and instructional leaders; relatively larger proportions of men, in contrast viewed themselves as general managers (p.26).

Total Years of Experience

The principal’s years of experience have been noted as an influence on a principal’s behavior when performing his or her job. Elberts and Stone (1988) indicated that the number of years of teaching experience that principals possess positively associated with a principal’s instructional leadership capacity. Conversely, Lyons (1994) documented that principals with more experience actually had lower levels of self-efficacy than principals with less experience.

Highest Degree Earned

Several reports have indicated that principals’ level of degrees do not have a statistically significant difference in principals’ of sense of efficacy. In other words, principals with doctorates do not exhibit any higher sense of efficacy than principals with master’s degrees (Aderhold, 2005; Smith et. al, 2005).

School Socioeconomic Status

Wimpelberg, Teddlie, and Stringfield (1989) emphasized the need for sensitivity to contextual factors such as socioeconomic status (SES), organizational level, and urbanicity that
may have an impact on the effectiveness of a school and a principal’s behavior. With regard to principal’s behavior, principal turnover has the greatest impact on the achievement of schools low socioeconomic status (Rowan and Denk, 1984).

All of the contextual variables can make a difference in a principal’s sense of efficacy which can eventually affect how successful the principal may be in his or her leadership capacity and in increasing student achievement. As will be demonstrated in upcoming sections, principals have a great opportunity to further develop potential and build community through leadership that supports the implementation of technology in the schools. Additionally, when strong technology leadership is added to the model of three-dimensional leadership, it becomes possible to achieve the fulfillments of the National Technology Plan, which calls for leadership program development.

Technology Leadership

In 2004, the U.S. Department of Education National Educational Technology Plan called for actions steps to assure that the intent of NCLB Title II Part D is fulfilled. One key step called for the strengthening of leadership. Leaders of all levels—school, district, and state—must provide transformational leadership for systemic change. Bass (1998) described transformational leadership as a leader’s motivational effect on followers who are motivated to serve and achieve more than they originally expected. The plan notes the following recommendations: (1) invest in leadership development programs to develop a new generation of tech-savvy leaders at every level; (2) retool administrator education programs to provide training in technology decision making and organizational change; (3) develop partnerships between schools, higher education, and the community; (4) encourage creative technology partnerships with the business
community; and (5) empower students’ participation in the planning process (U.S. Department of Education, 2004).

As the multiple facets of leadership, personal characteristics, and other contextual variables that have been discussed in previous sections combine to render an effective leader, technology leadership can serve to augment the facilitation of success in regard to student achievement.

Self-Efficacy

Transformational leadership, as defined in the previous section, is more likely to be achieved in leaders who possess a high sense of self-efficacy. Tschannen-Moran & Garies (2004) purported that a principal’s sense of self-efficacy greatly impacts whether or not he or she meets the required expectations and continuous demands of the position. Transformational principal leaders have often risen to the challenges because of their high levels of efficacy. To show the reasons behind this occurrence, this section will begin with a discussion of the theoretical foundation for self-efficacy and the social cognitive theory which serves as its basis.

Theoretical Foundation of Self-Efficacy

Self-efficacy is embedded within the social cognitive theory and developed roots from the social learning theory. This theory dates back to the late 1800s. Albert Bandura introduced this theoretical framework as one of triadic reciprocal causations or reciprocal interactions among behaviors, environmental variables and personal factors (Bandura, 1986, 1989; Pajares, 2004; Schunk, 2004). Triadic reciprocality is a theoretical framework that classifies student characteristic variables in three dimensions: personal learning characteristics, environmental
Factors, and personal learning behaviors. The interplay within the triad determines what individuals believe about themselves and it affects what actions they take. This reciprocal interaction does not necessarily imply that all sources of influence are of equal magnitude. In the social cognitive theory some sources of influence are stronger than others and they do not always occur in a harmonious fashion. In fact, the interaction that occurs between the three factors will vary depending on the individual, the distinct behavior being examined, and the specific situation in which the behavior occurs (Bandura, 1989). Bandura exemplifies self-efficacy beliefs as major predictors of individual behavior and behavioral change (Bandura, 1977; Coleman, 2004).

In the social cognitive view people are neither driven by inner forces nor automatically shaped and controlled by external stimuli. Rather, human functioning is explained in terms of a model of triadic reciprocality in which behavior, cognitive, and other personal factors, and environmental events all operate as interacting determinants of each other. (Bandura, 1986, p. 18)

Bandura later expanded the concept of human agency to collective agency due to his belief that humans do not live in isolation. He posited that humans work together and share in the same beliefs about their capabilities and aspirations to improve their quality of life (Bandura, 1997). The social cognitive theory emphasizes the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others (Bandura, 1994).

Schunk (2004) stated that social cognitive theory stresses the idea that much human learning occurs in a social environment. The component processes underlying observational learning are: (a) attention, including modeled events and observer characteristics; (b) retention,
including symbolic coding, cognitive organization, symbolic rehearsal, and motor rehearsal; (c) motor reproductions, including physical capabilities, self-observation reproduction, and accuracy of feedback; and (d) motivation, including external, vicarious, and self reinforcement (“TIP: Theory,” 2006).

Bandura (1994) purported that self-efficacy is defined as people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Bandura (1986) expressed the concept of self-efficacy as context specific and that there should be an existing distinction between component skills and the ability to perform actions. Self-efficacy has a great influence on an individual’s ability to make decisions, set and attain goals, the degree of energy that an individual possesses that goes into performing a task, and the duration of time that an individual will endure through challenges and barriers. It is important not to regard self-efficacy and self-esteem as synonymous terms (Oliver & Shapiro, 1993). Both terms relate to the judgments of individuals; however, self-efficacy deals with self capability, while self-esteem is more associative to self-worth. Self-efficacy beliefs determine how people feel, think, motivate themselves, and behave.

Teacher Self-Efficacy

Self-efficacy has an impact on teachers’ beliefs and how they inspire students to learn. Friedman and Kass (2002) suggested that for decades a teacher’s self-efficacy dealt with the teacher’s belief that a student’s behavior and academic achievement can be influenced, specifically those students who possess a low level of learning motivation. The focus of much past literature related to the teacher’s perception of his or her competence and the ability of teaching as a discipline to shape students’ knowledge, behaviors, and values (Friedman & Kass,
Current research denotes that teachers’ sense of efficacy relates to student outcomes such as academic achievement and behavior within the classroom (Milner & Hoy, 2003).

Jackson (1997) purported that various studies indicate a positive relationship between a teacher’s sense of self-efficacy and students’ classroom achievement. Additionally, teacher self-efficacy is considered to be one of the most powerful “explanatory variables” that impact student performance (Jackson, 1997, p. 108). Since self-efficacy is a forceful variable in student achievement, it is not surprising to discover that teachers with high levels of self-efficacy produce more productive students while teachers with low levels of self-efficacy tend to produce students with lower achievement levels. Teachers who have low levels of self-efficacy believe that students should take sole responsibility for their own learning and they also think external factors such as ability, motivation, or the familial background of the child causes students to perform poorly (Jackson, 1997). On the contrary, teachers who possess high levels of self-efficacy tend to take a more active role in supporting students. High efficacy teachers look for ways to support students who fail to make sure that students will learn to their fullest capacity. A teacher’s efficacy levels can be high or low depending on their efficacy expectation (Jackson, 1997).

Bandura’s (1986) research addresses high and low efficacy expectation. Bandura (1986) noted, “An efficacy expectation is the individual’s conviction that he or she can orchestrate the necessary actions to perform a given task, while outcome expectancy is the individual’s estimate of the likely consequences of performing that task at the expected level of competence.” When a high efficacy expectation is transferred to the classroom, it is evident the teacher sets objectives
and feels confident that he or she possesses the ability to improve the learning of students and that the students will meet required objectives (Bandura, 1986; Thompson, 2003).

Bandura (1997) purported that teachers with high efficacy influence student academic achievement and are more apt to devote more class time to instructional activities, provide extra guidance to students who need it, and praise students’ academic accomplishments more. Teachers with low efficacy believe that there is little they can do if students are unmotivated or there is environmental opposition. Teachers with low self-efficacy tend to exert more time on nonacademic pastimes, are more apt to easily give up on students if they do not get quick results, and often criticize students for their failure.

Jackson (1997) also discussed how a teacher’s level of efficacy can impact student achievement. Students who are already successful in a classroom tend to continue to achieve in a low self-efficacy teacher’s room, while students who have challenges within the classroom are more likely to struggle or fail due to minimum efforts of the teacher. This can be considered as a self-fulfilling prophecy. Quite often such occurrences lead to variances in student behavior and eventually variances in student achievement (Jackson, 1997).

Jackson (1997) believes that in order for students to achieve academically, they must have teachers who possess a high level of efficacy. Students need teachers who “believe in them, understand student transitions, theories of intelligences, instructional strategies, and classroom management techniques” (p. 110). Students will need teachers with high levels of efficacy to actively set high standards for themselves and their students, take personal responsibility for student learning, examine their own teaching performance when students fail, concentrate on academics, and stress that it is imperative that students continuously remain on task (Jackson, 1997).
Teaching self-efficacy, according to Bandura (1986), is believing in one’s teaching abilities and knowing that what you have learned will affect student achievement (p. 391). Gibson and Dembo (1984) believe that self-efficacy is not a single construct for the reason that self-efficacy can be classified into two domains, general teacher efficacy (GTE) and personal teacher efficacy (PTE). General teacher efficacy encompasses the belief that teaching and the educational system can engender student achievement despite possible negative influences external to the teacher. Personal teacher efficacy exhibits a belief in the teacher’s own ability to advance greatly the learning and achievements of his or her students.

Bandura (1997) argues that one’s self-efficacy belief can impact cognitive processes. In the book *Self-Efficacy: The Exercise of Control*, Bandura noted, “The major goal of formal education should be to equip students with the intellectual tools, efficacy beliefs, and intrinsic interest needed to educate themselves in a variety of pursuits throughout their lifetime” (p. 214). He also identified three key avenues in which efficacy beliefs operate as important contributors to the development of cognitive competencies that govern academic achievement: students’ beliefs in their efficacy to master different academic subjects, teachers’ beliefs in their personal efficacy to motivate and promote learning in their students, and faculties’ collective sense of efficacy that their schools can accomplish significant academic progress.

Researchers hypothesize that self-efficacy has a significant impact on the cognitive processes of students as they attempt to master a variety of course selections (Bandura, 1997; Bandura, 1995). Jenson (2001) conducted a study that asserted the beliefs relating to pre-service teachers using technology in course offerings. Jenson’s (2001) study revealed that faculty members fail to agree “how and to what extent” (p. 36) technology should be threaded throughout coursework. However, the students participating in the research study also revealed
their high self-efficacy beliefs by proclaiming their favoring of the implementation of technology in the college classroom setting and the use of technology’s impact on their academic progress, teaching knowledge and expectations in preparing to teach skills and concepts. One student in the study stated, “It is amazing what technology will allow you to do in the classroom” (p.66). Another student stated, “I learned lots of neat features that would work beautifully in my Calc reci as well as the pre-algebra we will be teaching” (p.66).

Meece, Wigfield, and Eccles (1990) found evidence that students’ performance in environments where they feel academically threatened depends more on their levels of efficacy than their level of emotional stress. Ropp (1999) contends that there is a high correlation between self-efficacy and performance. In addition to self-efficacy, Ropp (1999) mentioned that the pre-service teachers’ attitudes towards computers and computer anxiety are also key components which impact students’ performance.

Self-efficacy also has an impact on teachers’ beliefs and how they inspire students to learn. The research of Tucker et al. (2005) states that teacher efficacy has a major impact on the academic engagement of students from culturally diverse backgrounds, particularly African American and Latino students. Often teachers feel that they are not prepared to teach this population of students. The National Center for Education Statistics (2001) data purports that a gap exists in achievement levels of African American and Hispanic students versus their white counterparts. Tucker et al. (2005) believed that the results of the data may give validity to disparities between European students and culturally diverse students.

Soodak and Podell’s (1994) research inquiry discovered a statistically significant correlation between teacher self-efficacy levels and the number of special education student referrals. Their study involved 90 regular and special education teachers who received a case
scenario of students with learning and/or behavior issues. The participants were to determine if the students were justifiably placed in a special education program. Teachers with higher levels of efficacy regarding their teaching abilities tended to confidently believe that the students were placed correctly.

Teachers work collectively within an interactive social system; therefore, a faculty’s collective sense of efficacy that their school can accomplish significant academic progress is crucial to student success (Bandura, 1997). Hipp’s (1997) work regarding collective school and leadership efficacy purports that principal’s direct behaviors and indirect symbolic forms of leadership make a significant impact on teacher efficacy; thereby, increasing student academic achievement. A school’s level of efficacy also determines the level of parent participation in a child’s academic endeavors. Parents who participate in school scholastic activities increase student self-efficacy levels.

People’s beliefs about their self-efficacy can be developed by four sources of influence: mastery experience, vicarious experience, social persuasion, and reduction of people’s stress reaction. Altering emotional proclivities and misinterpretations of an individual’s physical states can greatly influence that individual’s self-efficacy (Bandura, 1997). Milner and Hoy (2003) believe that mastery experience is the most powerful source of efficacy—the view that successful performance raises the level of self-efficacy, while low performance lowers the level of self-efficacy beliefs. Continued low performance delivers future inadequate performance (Milner & Hoy, 2003). When individuals see others similar to themselves succeed by sustained effort it raises the observer’s belief that he or she possesses the ability to master similar activities to succeed (Bandura, 1994).
Milner and Hoy (2003) analyzed vicarious experiences as occurrences in which the skill in question was modeled by another individual. If the identified model performs well, the result increases the efficacy of the observer. Conversely, if the observer observes an incident of failure, despite high efforts, the observer’s judgments may lower his or her efficacy expectations and undermine their efforts (Milner & Hoy, 2003). Social persuasion is a third source of influence that will strengthen people’s beliefs that they possess what is needed to succeed. Bandura (1977, 1994), as cited in Bower & Hilgard (1981), explained that people who are verbally persuaded by themselves or others possess the ability to master activities and are more likely to mobilize greater effort and endure than if they internalize self-doubts and focus on their personal area of inadequacy when problems occur. Social persuasion may incorporate a pep talk or specific performance feedback (Milner & Hoy, 2003). The level of persuasion often depends on factors such as the persuader’s credibility, trustworthiness, and expertise (Bandura, 1977; Milner & Hoy, 2003).

The fourth source of influence is the reduction of stress or emotional arousal in the target situation (Bandura, 1977). People often rely on their emotional feelings to gauge their capabilities. They often relate stress reactions and tension to indicators of inability to perform specific tasks. Mood also has an impact on an individual’s feelings of efficacy. A student’s positive mood increases self-efficacy, whereas a negative mood can diminish it. The level of arousal, whether it is of excitement or anxiousness, can also affect the perception of competence or inadequacy (Milner & Hoy, 2003).

Cheniss (1993) provided another theoretical view of self-efficacy that consists of the following three specified domains: (a) Task domain denotes the level of the teacher’s skill in teaching and motivating students, (b) Inter-personal domain entails the teacher’s ability to work
harmoniously with others, (e.g. colleagues, direct supervisors); and (c) Organization domain involves the teacher’s ability to influence the social and political powers of the organization. Cherniss (1993) also noted that this triadic model leads to support in understanding and preventing teacher burnout.

Friedman and Kass’ (2002) work extended beyond the general definition of self-efficacy by making a more realistic description that reaches further than the classroom context of a teaching function, to viewing self-efficacy in a more organizational function. In this view the school is an organizational organism and the teacher serves as an organizational person. According to Friedman and Kass (2002), organizational efficacy is dissimilar to Bandura’s (1997) collective self-efficacy. In collective self-efficacy a group’s performance and defined organizational culture results in shared beliefs of members within the group. The members collectively believe that their identified goals can be achieved. Organizational efficacy encompasses individual’s beliefs in his or her ability to function as a key member within the organization and is capable of (a) contributing to achieving collective goals, (b) gaining support to improve personal functioning, and (c) improving relations with cohorts and supervisors within the organization (Friedman & Kass, 2002).

This section has offered numerous examples of studies which support the idea that teachers’ self-efficacy levels have direct and overwhelmingly positive ramifications on student success in the classroom. In an attempt to concentrate of the indicators of student cognitive skills and how they are specifically impacted by teachers’ self-efficacy, we focus the next section on reading.
Reading and Self-Efficacy

Long (2003) purports that a student’s ability to learn is a great phenomenon and that reading is of immense importance to our society because it is the major avenue to learning and has to be mastered in school. When students have difficulty learning to read it influences their motivation to learn, particularly in the primary grades. The Southeast Initiatives Regional Technology in Education Consortium (SEIR TEC, 2003) found that due to difficulty in learning to read, a large percentage of students continue to score below basic standards in reading achievement. The National Center for Educational Statistics (NSES, 2003) reported that fourth graders were performing better in reading in 2002 than in 1992, however not to a significantly different level. Additionally, the percentage of 12th-grade students performing at or above basic levels in 1998 and 2002 actually decreased in achievement compared to the percentage of 12th-grade students performing at or above basic levels in 1992.

Barkley (2006) investigated the relationship that exists between student learners and their teachers’ levels of self-efficacy. The study revealed two particular details. First, the study determined whether differences existed between a teacher’s efficacy beliefs and outcome expectancies about his or her ability to implement reading comprehension strategies, and the teacher’s ability to successfully implement effective classroom practices that improve reading comprehension. The results of Barkley’s (2006) study concluded that “a significant difference was not found for teacher and student efficacy beliefs about teaching and using cooperative learning as a means of creating better reading comprehension in the classroom” (p. 205). A second detail addressed within the study identified relationships that exist between student efficacy beliefs and students reading comprehension scores as measured by the school’s standardized testing measure. In this case, when looking at the relationship between teacher and
student outcome expectancy scores in the areas of prior knowledge, self monitoring, cooperative learning, and graphic organizers, statistically significant differences were found. Barkley’s (2006) study correlates with studies that conclude that self-efficacy beliefs are related to academic performance and self-regulated learning (Henson, 2002, p. 137). Gibson and Dembo (1984) identified that self-efficacy is directly related to student achievement within the classroom. They concluded that student achievement is a result of teachers who are more efficacious and these teachers often persevere longer with students who have academic challenges than their teaching peers who are less efficacious.

Acknowledging that reading comprehension may be an indicator of student learning and comprehension, this section has reviewed literature that has demonstrated teachers’ strong sense of efficacy having an impact in this area. Another factor that has an impact on student success is the use of computers for learning purposes. Studies evaluating the success of technology in the classroom to teach reading will be examined in the next section.

Technology and Reading

To improve reading instruction, organizations and initiatives support technology integration with reading. The National Reading Panel’s (NPR, 2000) Computer Technology and Reading subcommittee advocates the utilization of internet resources to support reading instruction. This type of advocacy results in several researchers asking the following question: How is technology used in reading instruction, and does it make a significant difference in reading achievement (Oliver, 2003)? There are multiple accounts of enhanced technology strategies to support reading achievement, and many documented successes; however, limitations to existing research and few studies to replicate in key areas (e.g. Internet resources in reading
instruction) make it difficult to advocate instructional technology solutions. The full potential of technology-based reading programs proclaiming to be “research based” continues to be investigated to assure that they align with the five National Reading Panel (NRP) components of reading that have undergone intensive study. The areas selected by NRP are: (a) alphabet, phonemic awareness instruction, and phonics instruction; (b) fluency; (c) comprehension, vocabulary instruction, text comprehension instruction, teacher preparation, and comprehension strategies instruction; (d) teacher education and reading instruction; and (e) computer technology and reading instruction. The research reviewed by NRP indicates positive and promising results that indicate how valuable technology is to reading instruction. The panel also depends on administrators’ abilities to pass on their knowledge and stand as advocates who promote research-based information. Lastly, in regard to initiatives, the No Child Left Behind Act of 2002 calls for the incorporation of technology with reading through The Reading First Initiative that targets improved reading instruction for students in grades K–3, with a component of teacher professional development focused on empirical reading research (Oliver, 2003).

An additional finding suggests that administrators play a key role in assuring teachers have supportive professional development opportunities that relate to reading and technology. Studies have determined that principals have an influence on reading achievement directly or indirectly (Hallinger & Heck, 1996). The three factors that have influenced a principal’s ability to foster successful reading programs are gender, experience, and training.

Many of today’s adolescents and teenagers are far more adept and knowledgeable of technology than adult generations before them. The use of electronic devices and information technology is intriguing and natural for 21st century learners (Fred, 2003). Our country must find leadership to expand our focus of the many ways to incorporate technology within the
curriculum and instructional teaching, to foster student learning in reading in order to compete with economic competition in an age of information (Leu, in press). Otherwise, technology will only be a means of keeping up with step by step instructions to detail how to use the most popular version of the latest technological toy.

Computer Self-Efficacy

In addition to fundamental teacher self-efficacy research, studies of teacher self-efficacy in computer usage have become more prevalent with the integration of increased technology usage within society—specifically the workplace (Compeau & Higgins, 1995), the university level (Karsten & Roth, 1998), and the school setting (Holcomb, Brown, Kulikowich, & Zheng, 2003). Holcomb et al. (2003) reported that technology efficacy plays a vital role when technology skills are being implemented within the instructional environment.

Compeau and Higgins (1995) define computer self-efficacy as the “judgment of one’s capability to use a computer” (p.192). It is not concerned with what an individual accomplished in the past, but about what judgments the individual can accomplish in the future. Computer self-efficacy is not concerned with simple subsets of skills such as entering information into a spreadsheet, but rather incorporating judgments that require the ability to apply broader tasks such as preparing detailed written reports.

Computer self-efficacy can be defined in the following dimensions: magnitude, strength, and generalizability (Compeau & Higgins, 1995). Computer self-efficacy’s magnitude dimension entails the level of capability expected. Individuals who possess high levels of computer self-efficacy magnitude may be expected to master more challenging computing tasks. Conversely, these individuals may believe that they require less technical support and assistance with related
technological tasks. The strength dimension of computer self-efficacy judgment involves the “level of conviction about the judgment or confidence” (p. 192) that individuals possess which makes them believe they have the ability to perform a task using technology. The generalizability dimension refers to “the degree to which the judgment is limited to a particular domain or activity” (p.192). In a computer environment, the domains may be in the form of various hardware and software designs and applications. Individuals with high levels of computer self-efficacy generalizability will be more competent in using a variety of software packages and computer systems.

Wallace’s (1999) investigation showed four components that have an impact on the development of computer self-efficacy. The components are computer anxiety, computer confidence, computer liking, and computer knowledge. Wallace found a statistically significant correlation between a computer self-efficacy model with four components and a model that consisted of three measurement components, therefore implicating that the model was a valid way to look at components of the computer self-efficacy construct. The same research compares education students and computing students. The computing students tended to exhibit lower levels of computer anxiety and higher levels of computer knowledge, computer liking, and computer confidence when compared with students in the area of education.

Recent research studies have addressed the issue of computer self-efficacy. Smith-Weber’s (1999) study addressed pre-service teacher technology efficacy by highlighting the magnitude of the four sources of self-efficacy: mastery experience, vicarious experience, social persuasion, and physiological and emotional states (Bandura, 1997).

Smith-Weber (1999) assessed the four sources of computer efficacy using a 20 item measure that related to the following scales: Mastery Experience Scale, Vicarious Learning
Scale, Social Persuasion Scale, and Affective States Scale. A 5 point Likert scale ranged from *strongly agree* with a rating of 5 down to *strongly disagree* with a rating of 1. The instrument was administered to participants during the microcomputer course term. Data was collected from the Fall of 1998 through the Spring of 1999 via the Background Questionnaire, comprised of demographic characteristics and personal computer ownership. Six class sections with an average of 35 students participated in completing the questionnaire. The study results found that there was a correlation between affective states and mastery experiences. Thus, the premise of the study revealed that high quality computer experiences are needed to decrease individual computer usage discomfort levels and increase individual’s computer self-efficacy competency (Smith-Weber, 1999).

Computer self-efficacy has an impact on students, pre-service teachers, and practicing teachers (Mayo, Kajs, & Tanguma, 2005; Ross, Hogaboam-Gray, & Hannay, 2001); and a teacher’s level of computer self-efficacy can have both positive and negative effects on student learning (Ross et al., 2001). The authors purported a linkage between high levels of self-efficacy of teachers to higher levels of student achievement based on a study they conducted with students in grades K through 3. The purpose of the study was to determine how changes in teacher levels of self-efficacy affected students. Students were monitored from one grade to the next as researchers closely documented whether changes in basic to advance level computer technology skills and self-efficacy. Students who moved from teachers with high levels of self-efficacy to teachers with low levels of self-efficacy improved slightly. However, students who moved from teachers with low levels of self-efficacy to teachers with higher levels of self-efficacy showed an increase in technology skills (Ross et al., 2001).
Technology efficacy levels have an impact on the pre-service teachers. Mayo et al. (2005) conducted a three-year longitudinal study assessing a program that prepared pre-kindergarten through grade 12 pre-service teachers to develop and deliver lessons that effectively incorporated technology within daily lesson planning and teaching of learner objectives. Three variables were used in the study: comfort level with technology, frequency of technology use, and efficacy. The study determined that all three variables produced statistically significant differences for comfort and frequency of use. Follow-up studies also determined that first year teacher candidate’s scores were more positive than alternative certification teachers who did not participate in any type of technology training. The first year teachers developed a higher level of self-efficacy because they believed that they could make a difference in incorporating technology within the curriculum.

Askar and Umay (2001) conducted computer self-efficacy research using pre-service elementary mathematics participants. The purpose of the study was to answer one of four questions: “What is the computer self-efficacy (CSE) of pre-service elementary mathematics teachers?” The study used 155 pre-service elementary math teachers as subjects. The participants were assessed using three different scales: Computer Self-Efficacy (CSE), Attitudes toward Computers (ATC), and Perception of Computer-Enriched Teaching Environments (PCETE). A questionnaire was also utilized to answer questions regarding frequency in computer usage. The findings of the study concluded that teacher self-efficacy in computer usage is low and the recently added computer courses offered to participants did not improve participant confidence levels.

Pratt (2002) noted the impact self-efficacy has on teachers’ confidence levels while teachers used the World Wide Web as a learning tool in their classrooms. The study claims that
Internet teaching efficacy levels also impacted the various purposes that teachers had for using the Internet with their students. The results indicate that teachers with higher Internet teaching efficacy tended to have broader purposes for using the World Wide Web. The broader purposes allowed for more autonomous learning and higher level thinking skills. The lower Internet teaching efficacy yielded narrow purposes and produced lower level technology usage and thinking skills.

Measurements of Computer Self-Efficacy

Computer self-efficacy levels have been determined using a variety of measures. The Murphy Scale is a popular scale used to measure “individuals’ self perceptions of accomplishments surrounding particular computer related knowledge and skills” (Khorrami-Arani, 2001; Murphy, Coover, & Owens, 1989). Bandura's theory of self-efficacy (1986) and Schunk’s model of classroom learning (1985) were the impetus for the creation of the scale (Khorrami-Arani, 2001; Murphy et al., 1989). The scale is composed of 32 items that relate to three tiers of computing skills: (a) beginning level, (b) advanced level, and (c) a level associated with mainframe computers. The Murphy Scale has been adopted and modified by other researchers. Delcourt and Kinzie (1993) developed the Self-Efficacy for Computer Technologies survey instrument, which has a similar design to that of Murphy et al. (1989). This instrument highlighted the specific computer task of word processing, electronic mail, and CD–ROM databases on three scales. Compeau and Higgins (1995) found what they believed were inadequacies in the Murphy scale and developed their own model of a computer self-efficacy scale (Khorrami-Arani, 2001).
Computer Technology and Education

NetDay Speak Up (2005), a technology survey conducted with more than 5,000 Texas teachers, revealed that 46% of the teachers believed that technology impacted student achievement, student engagement (57%), and collaboration and teamwork (35%). Only 12% of respondents believed that technology did not impact student achievement. The results of this survey are displayed in Figure 1.2.

![Technology's Impact - Student Performance](image)

*Figure 2.2. Technology’s impact—student performance.*

The same survey participants rated their technology usage skills (55%) as average when compared with their cohorts, 35% considered their skills as advanced, and 12% considered themselves to have novice or beginner skills. These data are illustrated in Figure 2.3.

The majority of teachers reported that pre-service preparation and school professional development offerings enhanced their levels of technology usage.
Figure 2.3 Teacher self-perception.

The Software Publishers Association (SPA) merged with the Software and Information Industry Association (SIIA, 2000) and released the executive summary of the 2000 Research Report on the Effectiveness of Technology in Schools. The report is based on studies supporting the use of technology and its impact on student achievement, attitudes, and interaction with educators and other students. The SPA report highlights the following positive effects of technology on student achievement, which are outlined as follows:

Positive effects have been found for all major subject areas, in preschool through higher education and for both regular education and special needs students. More specifically, large-scale, statewide implementations of educational technology (in West Virginia and Idaho) have been correlated with gains in standardized test scores. When looking at reading and language arts, technology has been shown to provide a learning advantage in the areas of phonological awareness, vocabulary development, reading comprehension, and spelling. Furthermore, the study indicates that students who utilize word processing software with carefully sequenced instruction in the writing process or writing tools with built-in guidance in the writing process
significantly improve their writing skills at a higher level than students who did not have access to the appropriate tools, as do students who write to a real audience via the Internet or e-mail.

Technology has also made an impact on core content areas of math, science, and social studies. The National Council of Teachers of Mathematics Standards (NCTM, 2000) promotes technology utilization for teaching mathematics. The council supports the belief that “technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students’ learning” (p. 11). Moreover, the Standards also highlight that “teachers should use technology to enhance their students’ learning opportunities by selecting or creating mathematical tasks that take advantage of what technology can do efficiently and well—graphing, visualizing, and computing” (pp. 25–26). In the area of math, technology is used to scaffold mathematics curriculum that requires hands-on problem solving, and constructivist and experiential activities. Students who take part in this form of technological environment have shown significant levels of understanding of specified math topics as compared to students who were recipients of traditional instruction.

Benefits of technology have also been revealed in studies focusing on science education. The National Science Teachers Association (NSTA, 2003) Standards for Science Teacher Preparation and National Science Education Standards (NSES, 1996) share a vision that supports the implementation of science with technology. These organizations appreciate how science and technology impact their communities and their lives. They also discriminate between “science as a process of investigation and technology as a process of design” (p. 2) (NSTA, 2003). The science standards call for teachers to actively engage their students in studies that demonstrate the relationship between science and technology. Activities such as simulations, microcomputer based laboratories, video to anchor instruction to real-world problems, and software that targets
students’ misconceptions have all increased student achievement in the area of science (NSTA, 2003). Similar results of increased student achievement have been noted when students develop multimedia presentations on social studies topics.

Special student populations have received an increase in student achievement after implementing technology. The National Center to Improve Practice (NCIP) received funding from the U.S. Department of Education, Office of Special Education Programs, from 1992–1998 to sponsor the operative use of technology to enhance educational outcomes for students with sensory, cognitive, physical, and social/emotional disabilities. Likewise the kindergarten technology learning environment is impacted with the support of technology through the National Educational Technology Standards for Students. Kindergartners who have utilized technology have profited educationally in areas such as improved conceptual knowledge, reading vocabulary, reading comprehension, and creativity. Students with special needs have also shown significant positive affects with using technology (SIIA, 2000). Speech recognition is especially valuable compensatory tool for students with learning disabilities. Interactive video and online telecommunication have also increased student achievement. Interactive video has been highly effective when skills and concepts to be learned have a visual component and when the software incorporates a research-based instructional design. The use of online telecommunication for collaboration across classrooms in different geographic locations can also improve academic skills (SIIA, 2000).

Summary

The literature review in this chapter presented research to open discussion of the dimensions of leadership, the personal characteristics of principals, and the various school
contextual variables; the interplay of these factors play a role in a principal’s level of self-efficacy. Subsequently, the principal’s level of self-efficacy has been shown in these studies to be correlated with student achievement.

The chapter also went into detail to give a historical perspective of the theoretical foundation of the social cognitive theory which encompasses self-efficacy. The chapter went on to give a detailed examination of self-efficacy as it relates directly to teacher success both alone and with the aid of technology. Finally, the chapter noted aspects of measurement tools used to measure computer self-efficacy, and overviewed several studies demonstrating technology’s impacts on regular and special needs student performance, and its impact on the teaching of core content areas.

The literature review also demonstrates how principals have a great opportunity to develop potential and build community through leadership that supports the implementation of technology in the schools. The literature noted how principals with three-dimensional leadership characteristics possessed high levels of self-efficacy even when they had to deal with contextual variables beyond their control (Jacobson & Conway, 1995; Lehman, 2007; Noonan, 2003). This three-dimensional leadership: instructional leadership, management leadership, and moral leadership, coupled with strong technological leadership, acts as a conduit in place to fulfill the necessities of the national technology plan that was initiated to fulfill the requirements of No Child Left Behind (NCLB) Title II Part D, which calls for leadership program development. Ultimately the literature review provided a base of background information that guides this study to determine whether a relationship exists between technology efficacy and leadership efficacy for principals who strive to keep the focal point on improving teaching, learning, and student academic achievement (King, 2002).
CHAPTER 3

METHODOLOGY

General Perspective

In Chapter 2, the review of the literature suggested that quality leadership combined with strong technology leadership could have vast import on increasing student academic achievement. Taking that concept further, the purpose of this study was to explore whether a relationship exists among Texas high school principals’ leadership characteristics (self-efficacy), Texas high school principals’ technology self-efficacy, select personal and school demographic variables, and select Texas principals’ campus ninth-grade students’ reading achievement as measured by the Texas Assessment of Knowledge and Skills (TAKS) reading scaled scores. This chapter presents information regarding this study’s research questions and defining terms related to the research. It will also explain research design, population selection, research instrumentation, collection of data, specific instruments used, as well as a detailed data analyses.

Research Questions

This study is guided by the following research questions:

1. Is there a relationship between principals’ technology proficiency, principals’ demographic characteristics, and student achievement in select Texas high schools?

   H0 1.1 There will be no relationship between principals’ scores on the World Wide Web subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned,
school socioeconomic status, school size, and ninth-grade reading TAKS scores of students from select Texas high schools.

H0 1.2  There will be no relationship between principals’ scores on the Teaching with Technology subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and ninth-grade reading TAKS scores of students from select Texas high schools.

H0 1.3  There will be no relationship between principals’ scores on the Integrated Applications subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and ninth-grade reading TAKS scores of students from select Texas high schools.

H0 1.4  There will be no relationship between principals’ scores on the Email subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, ninth-grade reading TAKS scores of students from select Texas high schools.

2. Is there a relationship between principals’ self-efficacy, principals’ demographic characteristics and student achievement in select Texas high schools?
H0 2.1 There will be no relationship between principals’ scores on the Moral Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and ninth-grade reading TAKS scores of students from select Texas high schools.

H0 2.2 There will be no relationship between principals’ scores on the Management Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and ninth-grade reading TAKS scores of students from select Texas high schools.

H0 2.3 There will be no relationship between principals’ scores on the Instructional Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and ninth-grade reading TAKS scores of students from select Texas high schools.

Participants

This study included a population of 129 Texas high school principals whose campuses were administered the 2008 Texas Assessment of Knowledge and Skills. The list of principals
was obtained from the Texas Education Agency (TEA) database. The database listed the campus and district of the principals.

Research Method and Design

This study employed quantitative research methods. Confidential online surveys were completed by principals. The National Human Genome Research Institute (2005) purports that confidentiality is the process of protecting an individual’s privacy; specifically, the treatment of information that an individual has elected to share with a relationship of trust, with the belief that the information will not be disclosed without consent. Participant names and school names were kept anonymous to protect the privacy of campuses, districts and individual participants. To assist with confidentiality, identifiable codes to a particular campus, principal, or teacher were re-coded. All participants received a letter requesting their participation in the research study before responding to survey questions. The information was used to obtain quantitative data. Gay and Airasian (2000), state that quantitative data “are used to describe current conditions, investigate relationships, and study cause-effect phenomena” (p. 11).

Dependent Variable

The dependent variable in the study was ninth-grade student reading achievement. This study used the 2008 Texas Assessment of Knowledge and Skills (TAKS) reading scaled scores for ninth-grade students to assess reading achievement. The TAKS is a state standardized exam used to assess student knowledge in the areas of reading, writing, and math at the primary and secondary school levels. The TAKS test was developed by Pearson Educational Measurement in collaboration with the Texas Education Agency. The TAKS objectives tested were aligned with
the Texas state curriculum known as the Texas Essential Knowledge and Skills (TEKS) (Texas Education Agency, 2009).

The TAKS reading test is structured in a multiple choice question format. Every portion of the exam includes multiple choice questions. The high school reading and English language arts (ELA) (combined reading and writing) tests also require students to answer three open-ended (short answer) questions: one on the literary selection, one on the expository piece, and one “crossover” synthesizing the two. The writing and ELA tests include a written composition as well. The ninth- to eleventh-grade reading test permits the use of a dictionary and/or thesaurus, and the high school math and science tests allow the use of calculators along with formula charts. Currently, the TAKS is not timed.

Independent Variable

The following variables were the independent variables used within the study: principal gender, total years of experience as a professional, total years of experience at current school, total years of principal experience, highest degree earned, school socioeconomic status, and school size. The Principal Sense of Efficacy Scale (PSES) subscales were used to measure self-efficacy and the Technology Proficiency Self Assessment (TPSA) subscales were a way to measure technology proficiency.

Procedures

The study began in the summer of 2009. A consent notice was emailed to high school principals to authorize their participation in the study (Appendix A). The principals were also emailed the Principal’s Sense of Efficacy Scale (PSES) (Appendix B) and the Technology
Proficiency Self Assessment (TPSA) (Appendix C). All correspondence was sent to participants via Survey Monkey (http://www.surveymonkey.com/) which is a Web based tool used to create customized surveys. A two week window was allowed for all surveys to be completed.

Quantitative data was gathered from Survey Monkey and submitted into Statistical Package for the Social Sciences (SPSS). Data collected from the TPSA, the PSES, and select demographic variables were used to determine whether a relationship existed among select Texas principals’ computer self-efficacy, leadership efficacy, and the principals’ campus ninth-grade reading scaled scores as measured by the Texas Assessment of Knowledge and Skills.

Instrumentation

Principal Sense of Efficacy Scale

“Principals’ self-efficacy beliefs are the beliefs in their capability to make a difference in the schools they lead, to effectively manage the challenges they face. The Principal Sense of Efficacy Scale asks principals to assess their capability concerning instructional leadership, management, and moral leadership” (Tschannen-Moran & Gareis, 2004). The PSES incorporates 18 questions used to measure principals’ beliefs about their ability to achieve various leadership tasks (Tschannen-Moran & Gareis, 2004). The survey, as shown in Appendix B, is structured in three sections: Principal’s Sense of Efficacy for Instructional Leadership, Principal’s Sense of Efficacy for Management, and Principal’s Sense of Efficacy for Moral Leadership. All three of the PSES domains are comprised of six survey items. The PSES is a 9-point Likert scale ranging in variation from not at all (1), to a great deal (9). The leading question for all survey items is “In your current role as principal, to what extent can you…”
The PSES has a high level of validity and reliability. The authors, Tschannen-Moran and Garies (2004) conducted a principal component factor analysis by grouping the following survey items: Principals’ Sense of Efficacy for Instruction, Principals’ Sense of Efficacy for Management and Principals’ Sense of Efficacy for Moral Leadership. The authors reported factor loadings ranging from .42 to .82, which explains 60% variance in principals’ sense of efficacy (Tschannen-Moran & Garieis, 2004). Testing was also administered to determine the PSES construct validity. The PSES was correlated with other constructs to determine if any relationships would emerge. The resulting correlation determined that the PSES had a positive correlation to trust in teachers, trust in students, and trust in parents. (Tschannen-Moran & Garieis, 2004).

**The Technology Proficiency Self Assessment**

The Technology Proficiency Self Assessment (TPSA) developed by Margaret Ropp (Ropp, 1999) was administered to survey participants. Margaret Ropp granted permission to use the TPSA (Appendix C). The TPSA (Ropp, 1999) was initially developed as an instrument used to measure teaching and learning with computers; however it is now used as a self-efficacy tool because it requires participants to rate their own confidence in performance of a technology related task (Knezek, Christensen, Miyashita, & Ropp, 2000). The TPSA consists of four measurement scales (with five items each: Email (Email), Integrated Applications (IA), Teaching with Technology (TT) and World Wide Web (WWW). These measurement scales are aligned with the International Society of Technology in Education technology standards for teachers and administrators (ISTE).
The Texas Assessment of Knowledge and Skills Reading Test

The Texas Education Agency (2009) provides criterion-related validity evidence for the TAKS Reading Test by the utilization of the 2004 Grade Study. The study compared the passing credit and no passing credit rates of grade nine Texas students within the 2003–2004 academic year English I course, with the students’ pass and fail rates on the Spring 2004 Grade 9 Reading TAKS. The overall results indicated that 87% of students in the study passed the Grade 9 Reading TAKS, while 85% of the students received passing credit in their English I course. There was also a noted correlation that existed in the students in the sample, 77% of students mastered the Grade 9 Reading TAKS and received passing credit in their English I course, while 5% of the students within the study failed their Grade 9 Reading TAKS and did not receive credit in their English I course. Only 10% of the students in the study passed Grade 9 Reading and did not receive passing credit in their English I course; 8% of the students failed the Grade 9 reading TAKS and received passing credit in their English I course.

The TAKS results have been reported in scale scores, a statistic that compares scores with the standards. The scale scores compensated for any differences in the difficulty of the items and allowed for direct comparisons of student performance between administrations and among forms of the test (TEA, 2006a). The scale scores ranged from 1000 to 3200 (TEA, 2006a). The scales remained the same for all the Texas state assessments, the TAKS reading and TAKS mathematics (TEA, 2005a).

The Texas Education Agency co-partnered with Pearson Educational Measurement (PEM) to provide reliability evidence for the TAKS Reading test. The Spring 2003 TAKS administration data was used to provide estimates of reliability for indicators under consideration. The reliability indicators used were the coefficient alpha (0.8745), a stratified
coefficient alpha (0.8821), and the Angoff-Feldt coefficient (0.8077).

Data Analysis

This study was a correlational study design and was quantitative in nature. The PSES and TPSA instruments used in the study have previously been subjected to analysis with regard to content validity (see instrumentation section). Additionally, Cronbach’s alpha for score reliability was calculated for each instrument used in the study.

Research Questions 1 and 2 used a correlational research method. Correlational research designs are founded on the assumption that reality is best described as a network of interacting and mutually causal relationships. Everything affects—and is affected by—everything else (Davis, 2009). The correlational method used in this study was a multiple regression. A multiple regression is based upon the general linear model (GLM), which is often used in social applied and social research. A multiple regression is used for determining the magnitude of the relationship between a criterion variable and a combination of two or more predictor variables (Gall, Gall, & Borg, 2003). In research Question 1, principals’ survey responses from the TPSA developed by Margaret Ropp (1999) were correlated with principals’ campus ninth-grade TAKS Reading scaled scores. The Technology Proficiency Self Assessment domain scores World Wide Web, Teaching with Technology, Integrated Applications, and Email were correlated with demographic variables as well. In Research Question 2, the PSES developed by Tschannen-Moran and Garieis (2004) was used to survey principals’ responses in the areas of Management Leadership, Moral Leadership and Instructional Leadership. The leadership domains were correlated with demographic variables and Texas principals’ campus ninth-grade TAKS Reading scaled scores.
Summary

In this chapter, a description of the participants within the study was noted as 129 Texas principals who served ninth-grade students. The principals were administered two surveys, The Technology Proficiency Self Assessment (TPSA) and the Principal Self-Efficacy Scale (PSES). The following personal and campus demographic data was collected for each principal: gender, schools social economic status, principal’s highest degree earned, school size, total years principal current school, total years a professional, total years as principal experience. The independent variables were the personal and campus demographic data as well as the TPSA measurement scales: Email, Integrated Applications, Teaching with Technology and World Wide Web, and the PSES domains: Principal’s Sense of Efficacy for Instructional Leadership, Principal’s Sense of Efficacy for Management, and Principal’s Sense of Efficacy for Moral Leadership. The dependent variable in this study was student achievement as measured by Grade 9, 2008 TAKS reading scaled scores.

The goal of this chapter was to outline the methods and procedures for gathering and analyzing the data which addressed the two research questions and related hypotheses. Information regarding participant descriptions, the details of the data collection surveys, and the technology proficiency and self-efficacy measurement scales were also given and discussed.

Next, Chapter 4 will go into further detail of the analysis of the data collected, in order to determine whether a relationship exists between principals’ self-efficacy and student achievement, and between principals’ technology self-efficacy and student achievement.
CHAPTER 4
RESULTS

Purpose of the Study

This chapter describes the results obtained utilizing the methods of research and data collection that were described in Chapter 3. Multiple regressions were run utilizing survey instrument’s data, the Principal Self-Efficacy Scale (PSES), the Technology Proficiency Self Assessment Scale (TPSA), and personal and campus demographic information. The data collected for this study would be used to explore the predictive relationships between Texas high school principals’ leadership (self-efficacy) characteristics based on subscales of the Principal Self-Efficacy Scale (PSES), Texas high school principals’ computer self-efficacy characteristics based on subscales of the Technology Proficiency Self Assessment Scale (TPSA), and select demographic variables; and to determine whether a relationship existed among these variables and the 2008 Texas Assessment of Knowledge and Skills (TAKS) reading scaled scores of the principals surveyed. The following research questions and hypothesis guided the study:

1. Is there a relationship between principals’ technology proficiency, principals’ demographic characteristics and student achievement in select Texas high schools?

H0 1.1 There will be no relationship between principals’ scores on the World Wide Web subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.
H0 1.2 There will be no relationship between principals’ scores on the Teaching with Technology subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 1.3 There will be no relationship between principals’ scores on the Integrated Applications subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 1.4 There will be no relationship between principals’ scores on the Email subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, TAKS ninth-grade reading scaled scores of students from select Texas high schools.

2. Is there a relationship between principals’ self-efficacy, principals’ demographic characteristics and student achievement in select Texas high schools?

H0 2.1 There will be no relationship between principals’ scores on the Moral Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, TAKS ninth-grade reading scaled scores of students from select Texas high schools.
current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 2.2 There will be no relationship between principals’ scores on the Management Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

H0 2.3 There will be no relationship between principals’ scores on the Instructional Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

In order to determine whether relationships occurred among the variables listed in the research questions, this chapter will begin by cataloging the descriptive statistics gathered from the participants involved in the study. Next, the reliability of the scales used will be highlighted, as well as the data assessment technicalities involved in the assessment. Finally, the last section of this chapter will display the specific results obtained using the multiple regression method, statistical significance hypothesis testing, and effect size for determining the magnitude of relationships that were observed.
Descriptive Statistics

The sample of this study comprised of a total of 129 Texas high school principals whose campus students were administered the 2008 Texas Assessment of Knowledge and Skills Reading Exam. The principal’s contact information was obtained from the Texas Education Agency (TEA) database which provides principals’ campus names, email addresses, and phone numbers. Request for participation in the study was obtained by district superintendents and/or campus principals. Descriptive statistics, including sample characteristics, frequencies, means, and correlations, were reported. Statistical Package for the Social Sciences version 16.0 was used to analyze all data.

Of the 129 participants, there were 93 male principals and 36 female principals (Table 4.1) in the study. For those participants who had advanced degrees, 22 had obtained a doctorate degree, while 107 had obtained a master’s degree. The high school campuses represented by the principals in the study denoted 68 Title I campuses, while 61 were non Title I campuses. The school enrollment size varied (Table 4.1); this data shows 22 of the school categorized as 5A campuses, 26 4A campuses, 12 3A campuses, 21 2A campuses, 42 1A campuses, and the remaining 4 school sizes were left unreported. Demographic information and the respective percentages for this study are illustrated in Tables 4.1 through 4.4.

Table 4.1

<table>
<thead>
<tr>
<th>Participant Gender</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>93</td>
<td>72.1</td>
<td>72.1</td>
<td>72.1</td>
</tr>
<tr>
<td>Female</td>
<td>36</td>
<td>27.9</td>
<td>27.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>129</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Of the 129 principal participants, 125 reported their 2008 campus Texas Assessment of Knowledge and Skills Reading Scaled scores, a statistic that compares scores with the standards (Table 4.5). The missing data was demographic in nature and had no association with the variables under study, therefore all 125 cases were considered usable for further analysis. The
minimum scaled score for the campuses was 2022 and the maximum scaled score was 2500. The mean of the standard scaled reported as 2257.76 and the standard deviation reported as 76.75.

Table 4.5 illustrates the principal’s years of experience. The descriptive results for the principal’s number of years at their current school reported the minimum years as 0 and the maximum number of years as 16, with a mean of 3.89 and the standard deviation of 3.74. The principal’s years of total principal experience reported the minimum as 0 and the maximum amount of years as 31, with a mean of 8.55 and the standard deviation of 6.50. The results of the principal’s total years as a professional reported the minimum of 3 and the maximum of 44, with a mean of 22.43 and the standard deviation of 8.30.

Table 4.5

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus 2008 Ninth Grade Reading Scaled Score (2008 TAKS Summary Report—All Students)</td>
<td>125</td>
<td>2022</td>
<td>2500</td>
<td>2257.76</td>
<td>76.75</td>
</tr>
<tr>
<td>Total Years as Principal at Current School</td>
<td>129</td>
<td>0</td>
<td>16</td>
<td>3.89</td>
<td>3.74</td>
</tr>
<tr>
<td>Total Years Principal Experience</td>
<td>129</td>
<td>0</td>
<td>31</td>
<td>8.55</td>
<td>6.50</td>
</tr>
<tr>
<td>Total Years as Professional</td>
<td>129</td>
<td>3.00</td>
<td>44.00</td>
<td>22.43</td>
<td>8.30</td>
</tr>
<tr>
<td>Valid n (listwise)</td>
<td>125</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Scale Reliability

Principal Self-Efficacy Scale

The reliability of the Principal Self-Efficacy Scale (PSES) was conducted using a measure of internal consistency called the Cronbach’s alpha. Alpha coefficients range in value from 0 to 1 and describe the reliability data underlying the PSES factors. A higher alpha yields more reliable PSES scores. The coefficient alpha for all 18 PSES collective items calculated a score of .930. The coefficient alpha for each domain of the PSES was also calculated. The PSES Instructional Leadership Scale domain coefficient alpha was calculated to be .873 for the 6 items within the domain. The PSES Management Leadership Scale domain coefficient alpha was calculated to be .884 for the 6 items within the domain. The PSES Moral Leadership Scale domain coefficient alpha was calculated to be .826 for the 6 items within the domain. These results are shown in Table 4.6.

Table 4.6

*Cronbach’s Alpha for the Principals Sense of Self-Efficacy Scale (PSES)*

<table>
<thead>
<tr>
<th>Efficacy Strands</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>.884</td>
</tr>
<tr>
<td>Instructional</td>
<td>.873</td>
</tr>
<tr>
<td>Moral</td>
<td>.826</td>
</tr>
<tr>
<td>Total</td>
<td>.930</td>
</tr>
</tbody>
</table>

Technology Proficiency Self-Assessment Scale

To assess the reliability of the Technology Proficiency Self-Assessment Scale (TPSA), Cronbach’s alpha was used. Alpha coefficients range in value from 0 to 1 and describe the reliability data underlying the TPSA factors. A higher alpha yields a more reliable TPSA scores. The coefficient alpha for the entire TPSA instrument was calculated and reported a Cronbach’s Alpha reliability calculated score of .932. The TPSA Email Scale domain reported a calculated
reliability score of .730 for the 5 items within the domain. The TPSA WWW Scale domain coefficient alpha was calculated to be .732 for the 5 items within the domain. The TPSA Integrated Applications Scale domain reported a calculated reliability score of .888 for the 5 items within the domain. The TPSA Teaching with Technology Scale domain reported a calculated reliability score of .877 for the 5 items within the domain. The results of this measure are displayed in Table 4.7.

Table 4.7

Cronbach’s Alpha for the Technology Proficiency Self-Assessment Scale (TPSA)

<table>
<thead>
<tr>
<th>Efficacy Strands</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>.730</td>
</tr>
<tr>
<td>World Wide Web</td>
<td>.732</td>
</tr>
<tr>
<td>Integrated App</td>
<td>.826</td>
</tr>
<tr>
<td>Teaching with Tech</td>
<td>.877</td>
</tr>
<tr>
<td>Total</td>
<td>.932</td>
</tr>
</tbody>
</table>

Data Assessment

Before the data analysis, it is important to ensure that the assumptions made about the relationship between the dependent and independent variables are correct and that the data is equivalent to the assumptions of the analysis. Visual checks are used to show the relationship, if any, between each predictor variable and the dependent variable assessed. Normal distributed data is reported using histograms, kurtosis, and skewness. Histograms show the relationship between two variables whose measures yield continuous scores (Gall, Gall, & Borg, 2003). Kurtosis is a statistical assessment that measures the flatness of the distribution. Skewness is a statistical assessment that determines to what extent data are concentrated above or below the mean, or, in the case of standardized data, above or below z=0 (Gall et al., 2003).
Ratio of Cases to Predictors

Tabachnick and Fidell (2001) recommend that the study sample size be greater than or equal to 104 plus the number of predictors. In this study, 8 predictors and a total sample size of 129 existed. The sample size was relative to the number of variables in the analysis. The number of participants in this study, which was 129, exceeds the ratio of cases to predictors recommended, which is 112 participants. Therefore, the results of the analysis used in this study can be considered reliable.

Absence of Outliers

The data was checked for outliers through examination of the range of the data, as well as scatter plots. No outliers were found in the data.

Missing Data

All variables were examined for missing values. Since no more than 5% of the data was missing and missing data patterns indicated the data was missing at random, missing data values were replaced with the mean of the scores from the appropriate variable (Tabachnick and Fidell, 2001).

Singularity and Multicollinearity

Multicollinearity and singularity are problems with correlation matrices that occur when variables are too highly correlated. For multicollinearity the variables are very highly correlated (> .90) and for singularity the variables are redundant (one variable is a combination of one or more other variables). These two conditions through examination of bivariate correlations will
appear as >.90. They can be checked through examination of the correlation matrix. This can also be checked through examination of multivariate correlations. When the regression is run, the collinearity diagnostics are checked to ensure that no condition index is greater than 30 and that no dimension (row) has more than one variance proportion greater than .50 (Tabachnick and Fidell, 2001).

Normality, Linearity, and Homoscedasticity

Normality of the continuous predictor and dependent variables were evaluated through examination of univariate histograms, as well as skewness and kurtosis values. The values should range between -2 and +2 to be able to consider the variables as normally distributed. Homoscedasticity was evaluated for each multiple regression through examination of residual scatter plots and indicated the data was homoscedastic. Results of these evaluations on the study variables for the TPSA and PSES are displayed in Tables 4.8 and 4.9, respectively.

Table 4.8

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>STD</th>
<th>Kurtosis</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Applications</td>
<td>20.92</td>
<td>4.5</td>
<td>1.502</td>
<td>-1.383</td>
</tr>
<tr>
<td>Teaching with Technology</td>
<td>21.09</td>
<td>3.834</td>
<td>.324</td>
<td>-0.897</td>
</tr>
<tr>
<td>E-mail</td>
<td>22.46</td>
<td>3.0257</td>
<td>-1.226</td>
<td>-1.597</td>
</tr>
<tr>
<td>World Wide Web</td>
<td>22.50</td>
<td>2.622</td>
<td>-2.00</td>
<td>-1.862</td>
</tr>
</tbody>
</table>

Table 4.9

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>STD</th>
<th>Kurtosis</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAKS</td>
<td>2257.76</td>
<td>75.537</td>
<td>.655</td>
<td>-.085</td>
</tr>
<tr>
<td>Instructional Leadership</td>
<td>46.26</td>
<td>5.59461</td>
<td>1.301</td>
<td>-.835</td>
</tr>
<tr>
<td>Management Leadership</td>
<td>42.72</td>
<td>6.78882</td>
<td>-.073</td>
<td>-.566</td>
</tr>
<tr>
<td>Moral Leadership</td>
<td>46.58</td>
<td>5.23861</td>
<td>1.634</td>
<td>-.850</td>
</tr>
</tbody>
</table>
Multiple Regression

The statistical method used in this study was multiple regression. A multiple regression is based upon the general linear model (GLM), which is often used in social applied and social research. A multiple regression is used for determining the magnitude of the relationship between a criterion variable and a combination of two or more predictor variables (Gall et al., 2003). A multiple regression can be expressed using the following equation that predicts Y:

\[ Y = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 + e. \]

The Pearson \( r \) is used to establish the strength of the relationship that exists between two variables. Cohen (1998) recommends using the following to determine the degree of strength between two variables:

- \( r = .10 \) to .29 or \( r = -.10 \) to -.29 small
- \( r = .30 \) to .49 or \( r = -.30 \) to -.49 medium
- \( r = .50 \) to 1.0 or \( r = -.50 \) to -1.0 large

When results are statistically significant, effect size can be used to measure the strength of the correlation or the percent variance. The effect size is an estimate of the magnitude of a difference, a relationship, or other effect in the population represented by a sample (Gall et al., 2003). The effect size can be found by squaring \( r \). As previously mentioned, Cohen (1988) presented benchmarks for effect sizes. The effect size can be noted as follows:

- Small = .01
- Medium = .09
- Large = .25

Multiple Regression Analysis with World Wide Web: Question I, Hypothesis 1.1

Question I asked, Is there a relationship between principals’ technology proficiency and principals’ demographic characteristics, and student achievement in select Texas high schools?
Hypothesis 1.1–1.4 follow:

H0 1.1 There will be no relationship between principals’ scores on the World Wide Web (WWW) subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

Using multiple regression to assess this relationship, the $F$ value of 1.499 ($df = 8, 128$) resulted in a $p$ value of .165, which is not a statistically significant result as $p > .05$. The null hypothesis, then, is not rejected in this case. The $R^2$ value of .091 and the Adjusted $R^2$ value of .030 indicated the predictor variables combined to explain 9.1% of the dependent variable variance. Thus, the predictor variables (principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and the World Wide Web subscale of the Technology Proficiency Self Assessment) combined to explain 9.1% of the variance found in TAKS ninth-grade reading scaled scores for principals surveyed. Although results were not statistically significant, the effect size of 9.1% may be considered moderate (Cohen, 1988).

Table 4.10 and 4.11 indicate the regression summary and analysis of the 8 predictor variables, collectively, on student achievement levels on Reading TAKS.

Table 4.10

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>$F$</th>
<th>$p$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>66352.601</td>
<td>8</td>
<td>8294.075</td>
<td>1.499</td>
<td>.165</td>
<td>.091</td>
<td>.030</td>
</tr>
<tr>
<td>Residual</td>
<td>663994.199</td>
<td>98</td>
<td>5533.285</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>730346.800</td>
<td>128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.11

Regression Analysis for Reading TAKS with World Wide Web

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$b$ weights</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>School SES</td>
<td>34.434</td>
<td>.018</td>
</tr>
<tr>
<td>Principal Highest Degree Earned</td>
<td>22.204</td>
<td>.227</td>
</tr>
<tr>
<td>Gender</td>
<td>-13.865</td>
<td>.357</td>
</tr>
<tr>
<td>School Size</td>
<td>-6.121</td>
<td>.228</td>
</tr>
<tr>
<td>World Wide Web</td>
<td>-1.568</td>
<td>.948</td>
</tr>
<tr>
<td>Total Years Principal at Current School</td>
<td>-1.546</td>
<td>.487</td>
</tr>
<tr>
<td>Total Years as Professional</td>
<td>1.245</td>
<td>.227</td>
</tr>
<tr>
<td>Total Years Experience as Principal</td>
<td>.364</td>
<td>.826</td>
</tr>
</tbody>
</table>

*indicates statistical significance ($p < .05$)

Table 4.11 provides unstandardized $b$ weights resulting from the regression analysis. The $b$ weights provide an indication of which predictor variables are receiving credit for explaining the dependent variable variance (ninth-grade reading TAKS scale scores). Based on the information provided for $b$ weights, School SES (34.434) was found to be the best predictor of reading TAKS achievement, followed by Principal’s Highest Degree Earned (22.204), Gender (-13.865), School Size (-6.121), World Wide Web (-1.568), Total Years Principal Current School (-1.546), Total Years as a Professional (1.245) and Total Years as Principal Experience (.364).

Multiple Regression Analysis with Teaching with Technology: Question I, Hypothesis 1.2

$H_0$ 1.2 There will be no relationship between principals’ scores on the Teaching with Technology subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school
size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

Using multiple regression to assess this relationship, the $F$ value of 1.505 ($df = 8, 128$) resulted in a $p$ value of .163, which is not statistically significant result as $p > .05$. The null hypothesis, then, is not rejected in this case. The $R^2$ value of .091 and the Adjusted $R^2$ value of .031 indicated the predictor variables combined to explain 9.1% of the dependent variable variance. Thus, the predictor variables (principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and the Teaching with Technology subscale of the Technology Proficiency Self Assessment) combined to explain 9.1% of the dependent variable variance. Although results were not statistically significant, the effect size of 9.1% may be considered moderate (Cohen, 1988). Tables 4.12 and 4.13 illustrate the regression summary and analysis of the 8 predictor variables, collectively, on student achievement levels on Reading TAKS.

Table 4.12

*Regression Summary of Demographic Variables with Teaching with Technology on Reading TAKS*

<table>
<thead>
<tr>
<th></th>
<th>$SS$</th>
<th>df</th>
<th>$MS$</th>
<th>$F$</th>
<th>$p$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>67047.908</td>
<td>8</td>
<td>8380.988</td>
<td>1.516</td>
<td>.158</td>
<td>.092</td>
<td>.031</td>
</tr>
<tr>
<td>Residual</td>
<td>663298.892</td>
<td>98</td>
<td>5527.491</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>730346.800</td>
<td>128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.13 provides unstandardized $b$ weights resulting from the regression analysis. The $b$ weights provide an indication of which predictor variables are receiving credit for explaining the dependent variable variance (ninth-grade reading TAKS scale scores). Based on the information provided for $b$ weights, School SES (34.458) was found to be the best predictor of
regression TAKS achievement, followed by Principal’s Highest Degree Earned (22.449), Gender (-14.075), School Size (-6.081), Total Years Principal Current School (-1.592), Total Years as a Professional (1.253), Teaching with Technology (-.389) and Total Years as Principal Experience (.281).

Table 4.13

**Regression Analysis for Reading TAKS with Teaching with Technology**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$b$ weights</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>School SES</td>
<td>34.458</td>
<td>.018</td>
</tr>
<tr>
<td>Principal Highest Degree Earned</td>
<td>22.449</td>
<td>.223</td>
</tr>
<tr>
<td>Gender</td>
<td>-14.075</td>
<td>.350</td>
</tr>
<tr>
<td>School Size</td>
<td>-6.081</td>
<td>.231</td>
</tr>
<tr>
<td>Total Years Principal at Current School</td>
<td>-1.592</td>
<td>.476</td>
</tr>
<tr>
<td>Total Years as Professional</td>
<td>1.253</td>
<td>.224</td>
</tr>
<tr>
<td>Teaching with Technology</td>
<td>-0.389</td>
<td>.830</td>
</tr>
<tr>
<td>Total Years Experience as Principal</td>
<td>0.281</td>
<td>.861</td>
</tr>
</tbody>
</table>

*indicates statistical significance ($p < .05$)

Multiple Regression Analysis with Integrated Applications: Question I, Hypothesis 1.3

H0 1.3 There will be no relationship between principals’ scores on the Integrated Applications subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.
Using the linear regression to assess this relationship, the $F$ value of 1.516 ($df = 8, 108$) resulted in a $p$ value of .158, which is not a statistically significant result as $p > .05$. The null hypothesis, then, is not rejected in this case. The $R^2$ value of .092 and the Adjusted $R^2$ value of .031 indicated the predictor variables combined to explain 9.2% of the dependent variable variance. Thus, the predictor variables (principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and the Integrated Applications subscale of the Technology Proficiency Self Assessment) combine to explain 9.2% of the dependent variable variance. Although the results were not statistically significant, the effect size of 9.2 may be considered moderated (Cohen, 1988). Tables 4.14 and 4.15 illustrate the regression summary and analysis of the 8 predictor variables, collectively, on student achievement levels on Reading TAKS.

Table 4.14

<table>
<thead>
<tr>
<th></th>
<th>$SS$</th>
<th>$df$</th>
<th>$MS$</th>
<th>$F$</th>
<th>$p$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>67047.908</td>
<td>8</td>
<td>8380.988</td>
<td>1.516</td>
<td>.158</td>
<td>.092</td>
<td>.031</td>
</tr>
<tr>
<td>Residual</td>
<td>663298.892</td>
<td>98</td>
<td>5527.491</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>730346.800</td>
<td>128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.15 provides unstandardized $b$ weights resulting from the regression analysis. The $b$ weights provide an indication of which predictor variables are receiving credit for explaining the dependent variable variance (ninth-grade reading TAKS scale scores). Based on the information provided for $b$ weights, School SES (34.469) was found to be the best predictor of reading TAKS achievement, followed by Principal’s Highest Degree Earned (21.525), Gender (-13.206), School Size (-6.163), Total Years Principal Current School (-1.540), Total Years as a
Multiple Regression Analysis with E-mail: Question 1, Hypothesis 1.4

H0 1.4 There will be no relationship between principals’ scores on the Email subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, TAKS ninth-grade reading scaled scores of students from select Texas high schools.

Using the linear regression to assess this relationship, the $F$ value of 1.526 ($df = 8, 128$) resulted in a $p$ value of .155, which is not statistically significant result as $p > .05$. Then null hypothesis, then, is not rejected in this case. The $R^2$ value of .092 and the Adjusted $R^2$ value of .032 indicated the predictor variables combined to explain 9.2% of the dependent variable variance. Thus, the predictor variables (principal gender, total years of experience as a
professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and the Email subscale of the Technology Proficiency Self Assessment) combine to explain 9.2% of the dependent variable variance. Although the results were not statistically significant, the effect size of 9.2 may be considered moderated (Cohen, 1988). The resultant unstandardized $b$ weight of the regression analysis is 2187.575. Tables 4.16 and 4.17 illustrate the regression summary and analysis of the 8 predictor variables, collectively, on student achievement levels on Reading TAKS.

Table 4.16

**Regression Summary of Demographic Variables with Email on Reading TAKS**

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>$F$</th>
<th>$p$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>67430.288</td>
<td>8</td>
<td>8428.786</td>
<td>1.526</td>
<td>.155</td>
<td>.092</td>
<td>.032</td>
</tr>
<tr>
<td>Residual</td>
<td>662916.512</td>
<td>98</td>
<td>5524.304</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>730346.800</td>
<td>128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.17

**Regression Analysis for Reading TAKS with E-mail**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$b$ weights</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>School SES</td>
<td>34.548</td>
<td>.018</td>
</tr>
<tr>
<td>Principal Highest Degree Earned</td>
<td>22.860</td>
<td>.215</td>
</tr>
<tr>
<td>Gender</td>
<td>-14.276</td>
<td>.343</td>
</tr>
<tr>
<td>E-mail</td>
<td>8.800</td>
<td>.656</td>
</tr>
<tr>
<td>School Size</td>
<td>-6.038</td>
<td>.234</td>
</tr>
<tr>
<td>Total Years Principal and Current School</td>
<td>-1.458</td>
<td>.514</td>
</tr>
<tr>
<td>Total Years as Professional</td>
<td>1.258</td>
<td>.222</td>
</tr>
<tr>
<td>Total Years Experience as Principal</td>
<td>.141</td>
<td>.932</td>
</tr>
</tbody>
</table>

*indicates statistical significance ($p < .05$)
Table 4.17 provides unstandardized $b$ weights resulting from the regression analysis. The $b$ weights provide an indication of which predictor variables are receiving credit for explaining the dependent variable variance (ninth-grade reading TAKS scale scores). Based on the information provided for $b$ weights, School SES (34.548) was found to be the best predictor of reading TAKS achievement, followed by Principal’s Highest Degree Earned (22.860), Gender (-14.276), Email (8.800) School Size (-6.038), Total Years Principal Current School (-1.458), Total Years as a Professional (1.258), and Total Years as Principal Experience (.141).

This section showed that statistically, no significant results were found regarding principals’ scores on the Technology Proficiency Self Assessment (TPSA) subscales: E-mail, World Wide Web, Integrated Applications, Teaching with Technology; the principal demographic characteristics, and the ninth-grade TAKS Reading scaled scores. The next section will analyze the data in order to determine whether a relationship exists between principal self-efficacy and student achievement in the Texas high schools participating in this study.

Multiple Regression Analysis with Moral Leadership: Question 2, Hypothesis 2.1

Question 2 asked, “What is the relationship between principal self-efficacy and student achievement in select Texas high schools?” Hypothesis 2.1-2.3 follows:

H0 2.1 There will be no relationship between principals’ scores on the Moral Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, schools SES status, school size, and TAKS ninth grade reading scaled scores of students from select Texas high schools.
Using the multiple regression to assess the relationship between principals’ scores on the Moral Leadership subscale of the Principal Sense of Efficacy Scale, the $F$ value of 1.513 ($df = 8, 128$) resulted in a $p$ value of .159, which is not statistically significant result as $p > .05$. The null hypothesis, then, is not rejected in this case. The $R^2$ value of .092 and the Adjusted $R^2$ value of .031 indicate the predictor variables combined to explain 9.2% of the dependent variable variance. Thus, the predictor variables (principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and the Moral Leadership subscale of the Principal Sense of Efficacy Scale) combine to explain 9.2% of the dependent variable variance. Although the results were not statistically significant, the effect size of 9.2% may be considered moderated (Cohen, 1988). Tables 4.18 and 4.19 illustrate the regression summary and analysis of the 8 predictor variables, collectively, on student achievement levels on Reading TAKS.

Table 4.18

<table>
<thead>
<tr>
<th></th>
<th>$SS$</th>
<th>$df$</th>
<th>$MS$</th>
<th>$F$</th>
<th>$p$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>66934.839</td>
<td>8</td>
<td>8366.855</td>
<td>1.513</td>
<td>.159</td>
<td>.092</td>
<td>.031</td>
</tr>
<tr>
<td>Residual</td>
<td>663411.961</td>
<td>98</td>
<td>5528.433</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>730346.800</td>
<td>128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.19 provides unstandardized $b$ weights resulting from the regression analysis. The $b$ weights provide an indication of which predictor variables are receiving credit for explaining the dependent variable variance (ninth-grade reading TAKS scale scores). Based on the information provided for $b$ weights, School SES (35.210) was found to be the best predictor of reading TAKS achievement, followed by Principal’s Highest Degree Earned (21.618), Gender (-
13.490), School Size (-6.378), Total Years Principal Current School (-1.484), Total Years as a Professional (1.219), Moral Leadership (.433), and Total Years as Principal Experience (.295).

Table 4.19

Regression Analysis for Reading TAKS with Moral Leadership

<table>
<thead>
<tr>
<th>Predictor</th>
<th>b weights</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>School SES</td>
<td>35.210</td>
<td>.017</td>
</tr>
<tr>
<td>Principal Highest Degree Earned</td>
<td>21.618</td>
<td>.242</td>
</tr>
<tr>
<td>Gender</td>
<td>-13.490</td>
<td>.371</td>
</tr>
<tr>
<td>School Size</td>
<td>-6.378</td>
<td>.215</td>
</tr>
<tr>
<td>Total Years Principal at Current School</td>
<td>-1.484</td>
<td>.506</td>
</tr>
<tr>
<td>Total Years as Professional</td>
<td>1.219</td>
<td>.238</td>
</tr>
<tr>
<td>Moral Leadership</td>
<td>.433</td>
<td>.741</td>
</tr>
<tr>
<td>Total Years Experience as Principal</td>
<td>.295</td>
<td>.853</td>
</tr>
</tbody>
</table>

*indicates statistical significance (p < .05)

Multiple Regression Analysis with Management Leadership: Question 2, Hypothesis 2.2

H0 2.2  There will be no relationship between principals’ scores on the Management Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

Using the linear regression to assess this relationship, the $F$ value of 1.517 ($df = 8, 108$) resulted in a $p$ value of .158, which is not a statistically significant result as $p > .05$. The null hypothesis, then, is not rejected in this case. The $R^2$ value of .092 and the Adjusted $R^2$ value of .001 indicated the predictor variables combined to explain 9.2% of the dependent variable
variance. Thus, the predictor variables (principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and the Management Leadership subscale of the Principal Sense of Efficacy Scale) combine to explain 9.2% of the dependent variable variance. Although the results were not statistically significant, the effect size of 9.2% may be considered moderated (Cohen, 1988). Tables 4.20 and 4.21 illustrate the regression summary and analysis of the 8 predictor variables, collectively, on student achievement levels on Reading TAKS.

Table 4.20

*Regression Summary of Demographics Variables with Management Leadership on Reading TAKS*

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>R²</th>
<th>Adj. R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>67059.002</td>
<td>8</td>
<td>8382.375</td>
<td>1.517</td>
<td>.189</td>
<td>.092</td>
<td>.031</td>
</tr>
<tr>
<td>Residual</td>
<td>663287.798</td>
<td>98</td>
<td>5527.398</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>730346.800</td>
<td>128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.21

*Regression Analysis for Reading TAKS with Management Leadership*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>b weights</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>School SES</td>
<td>34.761</td>
<td>.017</td>
</tr>
<tr>
<td>Principal Highest Degree Earned</td>
<td>22.003</td>
<td>.231</td>
</tr>
<tr>
<td>Gender</td>
<td>-13.833</td>
<td>.358</td>
</tr>
<tr>
<td>School Size</td>
<td>-6.416</td>
<td>.212</td>
</tr>
<tr>
<td>Total Years Principal at Current School</td>
<td>-1.432</td>
<td>.524</td>
</tr>
<tr>
<td>Total Years as Professional</td>
<td>1.241</td>
<td>.228</td>
</tr>
<tr>
<td>Management Leadership</td>
<td>.364</td>
<td>.717</td>
</tr>
<tr>
<td>Total Years Experience as Principal</td>
<td>.296</td>
<td>.852</td>
</tr>
</tbody>
</table>

*indicates statistical significance (p < .05)
Table 4.21 provides unstandardized $b$ weights resulting from the regression analysis. The $b$ weights provide an indication of which predictor variables are receiving credit for explaining the dependent variable variance (ninth grade reading TAKS scale scores). Based on the information provided for $b$ weights, School’s SES (34.761) was found to be the best predictor of reading TAKS achievement, followed by Principal’s Highest Degree Earned (22.003), Gender (-13.833), School Size (-6.416), Total Years Principal Current School (-1.432), Total Years as a Professional (1.241), Management Leadership (.364), and Total Years as Principal Experience (.296).

Multiple Regression Analysis with Instructional Leadership: Question 2, Hypothesis 2.3

H0 2.3 There will be no relationship between principals’ scores on the Instructional Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

Using a multiple regression to assess this relationship, the $F$ value of 1.500 ($df = 8, 108$) resulted in a $p$ value of .164, which is not a statistically significant result as $p > .05$. The null hypothesis, then, is not rejected in this case. The $R^2$ value of .091 and the Adjusted $R^2$ value of .030 001 indicated the predictor variables combined to explain 9.1% of the dependent variable variance. Thus, the predictor variables (principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and the Instructional Leadership subscale of the Principal Sense of Efficacy Scale) combine to explain 9.1% of the dependent
variable variance. Although the results were not statistically significant, the effect size of 9.1% may be considered moderate (Cohen, 1988). The resultant unstandardized $b$ weight of the regression analysis is 2184.465. Tables 4.22 and 4.23 illustrate the regression summary and analysis of the 8 predictor variables, collectively, on student achievement levels on Reading TAKS.

Table 4.22

Regression Summary of DV with Instructional Leadership on Reading TAKS

<table>
<thead>
<tr>
<th></th>
<th>$SS$</th>
<th>$df$</th>
<th>$MS$</th>
<th>$F$</th>
<th>$p$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>66397.672</td>
<td>8</td>
<td>8299.709</td>
<td>1.500</td>
<td>.164</td>
<td>.091</td>
<td>.030</td>
</tr>
<tr>
<td>Residual</td>
<td>663949.128</td>
<td>98</td>
<td>5552.909</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>730346.800</td>
<td>128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.23

Regression Analysis for Reading TAKS with Instructional Leadership

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$b$ weights</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>School SES</td>
<td>34.836</td>
<td>.019</td>
</tr>
<tr>
<td>Principal Highest Degree Earned</td>
<td>22.062</td>
<td>.231</td>
</tr>
<tr>
<td>Gender</td>
<td>-13.937</td>
<td>.355</td>
</tr>
<tr>
<td>School Size</td>
<td>-6.251</td>
<td>.233</td>
</tr>
<tr>
<td>Total Years Principal at Current School</td>
<td>-1.533</td>
<td>.492</td>
</tr>
<tr>
<td>Total Years as Professional</td>
<td>1.236</td>
<td>.233</td>
</tr>
<tr>
<td>Total Years Experience as Principal</td>
<td>.325</td>
<td>.838</td>
</tr>
<tr>
<td>Instructional Leadership</td>
<td>.140</td>
<td>.912</td>
</tr>
</tbody>
</table>

*indicates statistical significance ($p < .05$)

Table 4.23 provides unstandardized $b$ weights resulting from the regression analysis. The $b$ weights provide an indication of which predictor variables are receiving credit for explaining the dependent variable variance (ninth-grade reading TAKS scale scores). Based on the
information provided for $b$ weights, School SES (34.836) was found to be the best predictor of reading TAKS achievement, followed by Principal’s Highest Degree Earned (22.062), Gender (-13.937), School Size (-6.251), Total Years Principal Current School (-1.533), Total Years as a Professional (1.236), Total Years as Principal Experience (.325), and Instructional Leadership (.140).

Similar to the results showed in the analysis of Research Question 1, the analysis just reviewed also demonstrated no statistically significant results regarding principals’ scores on the Principal Sense of Efficacy Scale (PSES) subscales: Instructional Management, Leadership Management, and Moral Leadership; the principal demographic characteristics, and the ninth-grade Reading TAKS scaled scores.

Continued discussion on the findings resulting from the multiple regression analyses in this chapter and their inherent connotations will take place in the next and final summary section.

Summary

Chapter 4 presented data and analyses addressing the following research questions:

1. Is there a relationship between principals’ technology proficiency, principals’ personal and school demographic characteristics and student achievement in select Texas high schools?

2. Is there a relationship between principals’ self-efficacy, principals’ personal and school demographic characteristics and student achievement in select Texas high schools?

In summary, no statistically significant results were found regarding principals’ scores on the Technology Proficiency Self Assessment (TPSA) subscales: Email, World Wide Web, Integrated Applications, Teaching with Technology; the principal demographic characteristics,
and the ninth-grade TAKS Reading scaled scores. The TAKS Reading scaled scores were the
dependent variable. Likewise, no statistically significant results were found regarding principals’
scores on the Principal Sense of Efficacy Scale (PSES) subscales: Instructional Management,
Leadership Management, and Moral Leadership; the principal demographic characteristics, and
the ninth-grade Reading TAKS scaled scores. In these results, the TAKS Reading scaled scores
were also the dependent variables.

A statistical significance was not found within the multiple regressions conducted
utilizing the predictor variables: TPSA subscales, principals’ demographic characteristics, and
the ninth-grade 2008 Texas Assessment of Knowledge and Skills (TAKS) Reading scaled scores.
However, a relationship existed between all of the predictor variables when considering the
effect size. The effect size measured the strength of the correlation. With the effect size, each
multiple regression analysis was conducted using TPSA subscales: Teaching with Technology
and World Wide Web produced 9.1% of the variance explained within the dependent variable; The
TPSA subscale Integrated Application and Email produced an effect size of 9.2% of the
variance explained within the dependent variable.

No statistically significant results were found regarding principals’ scores on the
Principal Sense of Efficacy Scale (PSES) subscales. The effect size was measured and the results
indicated that a relationship existed between all of the predictor variables when incorporating the
effect size. The PSES subscale Instructional Leadership produced an effect size of 9.1% of the
variance explained within the dependent variable. The PSES subscales Management Leadership
and Moral Leadership both produced an effect size of 9.2% of the variance explained within the
dependent variable.

The effect size measured the strength of the correlation. With the effect size, each
multiple regression analysis was conducted using TPSA subscales: Teaching with Technology and World Wide Web produced 9.1% of the variance explained within the dependent variable; subscales Integrated Application and Email produced an effect size of 9.2% of the variance explained within the dependent variable. When measuring effect size, the effect sizes of 9.1% and 9.2% are moderate; therefore, relationships do exist between all predictor variables tested.

In this chapter, data obtained from participating high school principals was analyzed in pursuit of answering the research questions posited. The outcome upon analysis of the data revealed that relationships did exist between the predictor variables studied and student achievement, and the strength of this relationship was determined by measurement of the effect size. The concluding chapter will go on to continue discussion of self-efficacy and technology proficiency in principals, demonstrating the significance of their relationship to student achievement. Chapter 5 will summarize the findings of this study, draw conclusions, and offer recommendations for further research.
CHAPTER 5
FINDINGS, DISCUSSION, RECOMMENDATIONS, AND CONCLUSIONS

In the future, technology will continue to rapidly change in a world of multi-literacies; therefore, to increase student achievement in the current Digital Age, principals must possess high levels of self-efficacy that can be found within management leadership, moral leadership, and instructional leadership skills. They must also possess and model competence in areas of technology that require usage of e-mail, the World Wide Web, teaching with technology, and integrated applications in which technology users use a variety of software packages.

This study was conducted to contribute to the existing knowledge base of principal leadership self-efficacy, principal technology proficiency, and student achievement. The two guiding questions of this research study focused on the relationship between Texas public school principals’ technology proficiency as measured by subscales of the Technology Proficiency Self Assessment (TPSA), principals’ sense of self-efficacy as measured by subscales of the Principal Self-Efficacy Scale (PSES), select principal personal and campus characteristics, and student achievement as measured by select principals’ campus 2008 Texas Assessment of Knowledge and Skills (TAKS) ninth-grade reading scaled scores. The results of the study revealed that relationships did exist between the predictor variables studied and student achievement. Multiple regressions were utilized to determine statistical significance of results. In order to determine practical significance, effect size was calculated to measure the strength of any relationships that existed (Cohen, 1988). All data were analyzed using SPSS 16.0. This chapter summarizes the findings and includes discussion, conclusions, and recommendations related to this study.
Summary of Findings

To answer this research study’s two questions, statistical procedures were implemented. Descriptive statistics involving means and standard deviations were calculated. Multiple regressions were run utilizing subscales of the Technology Proficiency Self Assessment (TPSA): E-mail (E-mail), Integrated Applications (IA), Teaching with Technology (TT), and World Wide Web (WWW). Correlations using subscales of the Principal Self-Efficacy Scale (PSES): Principals’ Sense of Efficacy for Instruction, Principals’ Sense of Efficacy for Management, and Principals’ Sense of Efficacy for Moral Leadership were conducted. Multiple regressions was again used with principals' personal and school demographic variables and 2008 Texas Assessment of Knowledge and Skills ninth-grade reading scaled scores. The demographic variables used within the study were selected principal and campus demographic characteristics: principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, and school size.

This study answered two questions: Question 1 asked, “Is there a relationship between principals’ technology proficiency, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?” Question 2 asked, “Is there a relationship between principals’ self-efficacy, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?” The results of this study revealed relationships, although moderate (Cohen, 1988), existed between principal’s self-efficacy and student achievement, and principal’s technology proficiency and student achievement as measured by the 2008 ninth-grade TAKS reading test. The statistical results of the hypotheses were revealed as explained in the next section.
Research Question 1

Hypothesis 1.1: There will be no relationship between principals’ scores on the World Wide Web subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

There was no statistically significant result because the $p$ value of .165 was greater than .05. This result indicates that there was no significant relationship between variables but variables can possibly be attributed to the low number of respondents in the study. However, when examining the effect size of 9.1%, the amount of variance attributed to the dependent variable was considered moderate. Therefore, in terms of practical significance, there was a relationship that existed between the WWW subscale of the Technology Proficiency Scale, principal personal and campus demographics, and TAKS ninth-grade reading scaled scores.

Hypothesis 1.2: There will be no relationship between principals’ scores on the Teaching with Technology subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

There was no statistically significant result because the $p$ value of .163 was greater than .05. This result indicates that there was no significant relationship between variables but variables can possibly be attributed to the low number of respondents in the study. However,
when examining the effect size of 9.1%, the amount of variance attributed to the dependent variable was considered moderate. Therefore, in terms of practical significance, there was a relationship that existed between the Technology Proficiency Scale, principal personal and campus demographics, and TAKS ninth-grade reading scaled scores.

Hypothesis 1.3: H0 1.3 There will be no relationship between principals’ scores on the Integrated Applications subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

There was no statistically significant result because the $p$ value of .158 was greater than .05. However, when examining the effect size of 9.2%, the amount of variance attributed to the dependent variable was considered moderate. Therefore, in terms of practical significance, there was a relationship that existed between the Technology Proficiency Scale, principal personal and campus demographics, and TAKS ninth-grade reading scaled scores.

Hypothesis 1.4: H0 1.4 There will be no relationship between principals’ scores on the E-mail subscale of the Technology Proficiency Self Assessment, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

There was no statistically significant result because the $p$ value of .155 was greater than .05. This result indicates that there was no significant relationship between variables but variables can possibly be attributed to the low number of respondents in the study. However,
when examining the effect size of 9.2%, the amount of variance attributed to the dependent variable was considered moderate. Therefore, in terms of practical significance, there was a relationship that existed between the Technology Proficiency Scale, principal personal and campus demographics, and TAKS ninth-grade reading scaled scores.

Research Question 1 asked, “Is there a relationship between principals’ technology proficiency, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?” The results of this study indicated that in terms of practical significance a relationship existed between the predictor variables and student achievement. Although many educational organizations have not totally embraced technology within the fabric of the curriculum (Seay, 2004), it is important to note that the principals’ level of technology proficiency has a moderate impact on student achievement for ninth-grade students tested in the area of reading based on 2008 TAKS ninth-grade reading scaled scores. Research has revealed the importance of principal leadership in which principals are not only technologically proficient, but are also supportive of technology within the school environment (Seay, 2004). Gibson (2001) purported, “The number one issue in the effective integration of educational technology into the learning environment is not the preparation of teachers for technology usage, but the presence of informed and effective leadership” (p. 1). When principals recognize their leadership capacity in the area of technology, then improvements can be made in our nation’s schools (Seay, 2004). Strong leadership from technologically proficient principals may serve as the catalyst for change in the educational achievement of students from low socioeconomic backgrounds, considering the fact that technology has spurred social and economic changes in our society. Schools should be the foundational source of change when under the leadership of a principal with a high level of efficacy and technological proficiency.
Research Question 2

Is there a relationship between principals’ self-efficacy, principals’ demographic characteristics, and student achievement in select Texas high schools?

Hypothesis 2.1: There will be no relationship between principals’ scores on the Moral Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

There was no statistically significant result because the $p$ value of .159 was greater than .05. This result indicates that there was no significant relationship between variables but variables can possibly be attributed to the low number of respondents in the study. However, when examining the effect size of 9.2%, the amount of variance attributed to the dependent variable was considered moderate. Therefore, in terms of practical significance, there was a relationship that existed between the Moral Leadership subscale of the Principal Self-Efficacy Scale, principal personal and campus demographics, and TAKS ninth-grade reading scaled scores.

Hypothesis 2.2: There will be no relationship between principals’ scores on the Management Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

There was no statistically significant result because the $p$ value of .158 was greater than
.05. This result indicates that there was no significant relationship between variables but variables can possibly be attributed to the low number of respondents in the study. However, when examining the effect size of 9.2%, the amount of variance attributed to the dependent variable was considered moderate. Therefore, in terms of practical significance, there was a relationship that existed between the the Management Leadership subscale of the Principal Self-Efficacy Scale, principal personal and campus demographics, and TAKS ninth-grade reading scaled scores.

Hypothesis 2.3: There will be no relationship between principals’ scores on the Instructional Leadership subscale of the Principal Sense of Efficacy Scale, principal gender, total years of experience as a professional, total years as principal at current school, total years of principal experience, highest degree earned, school socioeconomic status, school size, and TAKS ninth-grade reading scaled scores of students from select Texas high schools.

There was no statistically significant result because the $p$ value of .164 was greater than .05. This result indicates that there was no significant relationship between variables but variables can possibly be attributed to the low number of respondents in the study. However, when examining the effect size of 9.1%, the amount of variance attributed to the dependent variable was considered moderate. Therefore, in terms of practical significance, there was a relationship that existed between the Principal Self-Efficacy Scale, principal demographics characteristics, and TAKS ninth-grade reading scaled scores.

Question 2 asked, “Is there a relationship between principals’ self-efficacy, principals’ demographic characteristics, and student achievement in select Texas high schools?” The results of this study indicated that in terms of practical significance, a relationship did exist between the
predictor variables and student achievement. Relationships, although moderate (Cohen, 1988), were revealed to exist between principal’s sense of self-efficacy and student achievement as measured by the 2008 TAKS ninth-grade reading scaled scores.

Hallinger and Heck (1998) noted that the relationship between the school and its leadership is both interactive and dynamic in that principals consistently participate in a stream of interactions over a period of time and eventually influence the environmental and academic outcomes of the school. These interactions have similarities to Bandura’s (1977) social cognitive theory that emphasizes self-efficacy. Self-efficacy levels of individuals have a great impact on an individual’s behavior and how much effort is exerted by an individual in completing tasks, accomplishing goals, and relating to his or her own environment. Hallinger and Heck’s (1998) aforementioned research demonstrated the importance of principals maintaining high levels of self-efficacy in the area of leadership, which can lead to increased student achievement.

According to Tschannen-Moran and Gareis (in press), without a principal’s leadership, efforts to raise student achievement will be futile.

In research conducted by Tschannen-Moran and Gareis (in press) using bivariate correlations, of personal and campus demographic variables were not found to be very strong predictors of efficacy beliefs of principals. However, when Tschannen-Moran and Gareis (in press) utilized regression analysis with the Principal Sense of Efficacy Scale, gender was found to be a predictor of principals’ self-efficacy beliefs. Female principals showed higher levels of efficacy than their male counterparts. The same study found no correlation between principals’ years of experience and self-efficacy. Principals who worked in more challenging settings with students from low socioeconomic backgrounds (which was determined based on the number of students receiving free or reduced lunch) were found to have lower levels of self-efficacy. In this
study, which utilized multiple regression with subscales of the Principal Sense of Efficacy Scale and the subscales of the Technology Proficiency Self Assessment, 2008 ninth-grade reading TAKS scaled scores, and principals’ personal and campus demographic characteristic, both subscales revealed that the best predictors of student achievement were as follows (in order from the highest): school socioeconomic status, principal’s highest degree earned, and principal's gender. Other researchers (Smith et al., 2005; Aderhold’s, 2005) have concluded with results that the highest degree earned did not make a significant difference in student achievement.

Implications

This research study sought to determine whether a relationship existed between principals’ self-efficacy, principals’ technology proficiency, principals’ personal and school demographics, and student achievement as measured by the 2008 TAKS ninth-grade reading scaled scores. This study has implications for educational arena practitioners and programs. Principals will rather directly or indirectly continue to be catalysts for change that will increase student achievement. First, principals must obtain support and the required skills in the areas of instructional leadership, management leadership, and moral leadership, as well as their technology proficiency. This study provides justification for the need for more professional development offerings in the areas of leadership efficacy and technology to support principals in their quest to improve student achievement. Professional development will play a vital role in strengthening leadership and developing principals as leaders of leaders. The professional development offerings will come in a variety of formats from online virtual learning to newly designed human capital and development leadership modules delivered by entities such as education service centers, administrator preparation programs, and universities.
Second, the research may be used to drive the decision-making process regarding allocations of funds for leadership development and technology infrastructure. With budget cuts being made throughout all types of organizations, this study can be of benefit to entities, such as state educational advisory and technology advisory committees, which make recommendations to state education agencies and state legislators that provide financial support to public and charter schools.

Third, the study lays the ground work for a Digital Age learning community. Principals will serve as leaders of Digital Age learning communities where students are given opportunities to be active in e-learning that meets the diverse needs of learners. Students will participate in individualized prescriptions for interactive learning and leadership opportunities. Students will have a variety of options regarding the career passageway that is best suited for their social, intellectual, and cultural backgrounds. Students will be able to rely on cultural connections in order to understand curriculum. When cultural connections are made, students are more apt to achieve or master specific objectives beyond standardized test objectives.

Recommendations

Based on the results of this study and the review of relevant literature, the following recommendations should be considered to further explore the relationships between principals’ sense of efficacy, principals’ technology proficiency, and student achievement with consideration for principals’ personal and school demographic characteristics. More replication studies should use the Principal’s Sense of Efficacy (PSES) developed by Tschannen-Moran and Gareis (2004). The subscales Instructional Leadership, Management Leadership, and Moral Leadership should be focused on to determine which subscale is the better predictor of student
achievement in schools in the United States—specifically with respect those schools that serve students in high poverty areas where the majority of the student population receive free or reduced lunch.

The Lexile Reading Framework is a scientifically-based approach to reading and text measurement. The framework incorporates the Lexile scale, which is a numeric representation of the reader’s ability. This developmental scale for reading ranges from 200L (“L” for Lexile) for emergent readers to 1700L for advanced readers. The Lexile Reading Framework measure is one of the most widely used reading measures today (Lennon & Burdick, 2004). Numerous published articles and newspapers report Lexile scores. With Lexile scores, researchers will be able to have an aligned reading achievement measure instead of the researcher struggling to interpret and align various standardized tests that are found from state to state.

Principal technology proficiency should continue to be an area for research. Technology is given the credit for productivity in the workplace. Therefore, some believe that technology implementation in the school will do more to increase educational opportunities and quality (Valdez, 2004). If principals are effective implementers of technology and exhibit positive leadership behaviors towards technology, they may, in turn, initiate and advocate support for the usage of technology to increase teaching and learning and support funding to support technology which may lead to educational change (ETAC, 2006; Fullen, 2002; Valdez, 2004).

The Technology Proficiency Self Assessment (TPSA) developed by Margaret Ropp (1999) was administered to participants in this study. The TPSA, although initially used as an instrument for teaching and learning proficiency with computers, measures self-efficacy in computer use. Participants rate their performance in the following four measurement scales: E-mail, Integrated Applications, Teaching with Technology, and World Wide Web. Although the
instrument is aligned with the International Society of Technology in Education technology standards for teachers and administrators (ISTE, 2002), there were limitations in using the TPSA survey instrument. A few of the survey instrument responses are outdated. For example, one response states, “I feel confident that I could…save documents in formats so that others can read them if they have different word processing programs (e.g. saving Word, ClarisWorks, RTF, or text).” Some of the participants in the study may not be familiar with ClarisWorks or RTF. An explanation may need to be given to explain the changes in software programs over time. Researchers may want to use a more current technology proficiency survey instrument that measures the same constructs but clearly uses up-to-date language, or the researcher may modify the TPSA questions to reflect changes in technology language. A survey instrument that measures principal sense of efficacy and principal technology proficiency would be even more beneficial for researchers examining these constructs.

Conclusion

For this study, the following research questions were addressed:

1. Is there a relationship between principals’ technology proficiency, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?

2. Is there a relationship between principals’ self-efficacy, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?

Multiple regressions were utilized to indicate whether relationships existed between the independent variables—principal’s sense of efficacy, technology proficiency, and principals’ personal and school demographic characteristics and dependent variables—2008 ninth-grade
TAKS reading scaled scores. When considering the effect size and practical significance, the overall results of the study indicated that relationships did exist between the 129 principals’ surveyed levels of technology proficiency, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools. The study also revealed, considering the effect size and practical significance that relationships did exist between principals’ surveyed sense of self-efficacy, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools. Based on the regression analysis of the predictor variables within the study, the school’s social economic status, followed by principal’s highest degree earned and principal’s gender, accounted for the largest amount of variance within the 2008 Texas Assessment of Knowledge and Skills ninth-grade reading scaled scores. In other words, a school’s socio-economic status, a principal’s highest degree earned, and a principal’s gender play an important role in increasing student achievement on the 2008 ninth-grade TAKS reading test. The hope is that this research will add to the current body of literature that supports principal leadership and principal technology competency that impacts student achievement of students in Texas and around the world.
APPENDIX A

PRINCIPAL’S SENSE OF EFFICACY SCALE

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1. Personal and School Demographic Characteristics

Your participation in this survey is voluntary and you may choose to end your participation at any time. In addition, your answers are confidential as your name or school will not be used in the research paper and there are no foreseeable risks to you for your participation in the survey. The researcher will have access to the key that links participant information to their coded responses; that key will be destroyed once the data collection is complete. Data will be reported in the aggregate and not attributed directly to one person.

**1. What is your Campus Code?**  

**2. What is your campus 2008 Ninth Grade Reading Scaled Score?**  
(Refer to 2008 TAKS Summary Report–All Students)

**3. What is your campus 2008 Ninth Grade Reading Percentage Passing Score?**

**4. What is your gender?**  
- [ ] Male  
- [ ] Female

**5. What is your age?**

**6. What is your total years experience as a professional?**

**7. What is your total years as principal at current school?**

**8. What is your total years of principal experience?**

**9. What is your highest degree earned?**  
- [ ] Bachelors  
- [ ] Masters  
- [ ] Doctorate
2. Principal’s Sense of Efficacy Survey

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

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

**1. "In your current role as principal, to what extent can you..."**

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>7</th>
<th>8</th>
<th>9</th>
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</thead>
<tbody>
<tr>
<td>1. Facilitate student learning in your school?</td>
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<td>2. Generate enthusiasm for a shared vision for the school?</td>
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<td>3. Handle the time demands of the job?</td>
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<td>4. Manage change in your school?</td>
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<td>5. Promote school spirit among a large majority of the student population?</td>
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<td>6. Create a positive image of your own daily schedule?</td>
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<td>7. Raise student achievement on standardized tests?</td>
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<td>8. Promote a positive image of your school with the media?</td>
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<td>9. Motivate teachers?</td>
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<td>10. Promote the prevailing values of the community in your school?</td>
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<td>11. Maintain control of your own daily schedule?</td>
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<td>12. Shape the operational policies and procedures that are necessary to manage your school?</td>
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<td>13. Handle effectively the discipline of students in your school?</td>
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<td>14. Promote acceptable behavior among students?</td>
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<td>15. Handle the paperwork required of the job?</td>
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<td>16. Promote ethical behavior among school personnel?</td>
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<td>17. Cope with the stress of the job?</td>
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<td>18. Prioritize among competing demands of the job?</td>
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APPENDIX B

TECHNOLOGY PROFICIENCY SELF ASSESSMENT

Reproduced with permission of the Institute for the Integration of Technology in Teaching and Learning.
### 3. Technology Proficiency Self-Assessment

Instructions: Select one level of agreement for each statement to indicate how you feel.

Strongly Disagree, Disagree, Undecided, Agree, Strongly Agree

**1. I feel confident that I could...**

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
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</thead>
<tbody>
<tr>
<td>send email to a friend.</td>
<td>o</td>
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<tr>
<td>subscribe to a discussion list.</td>
<td>o</td>
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<tr>
<td>create a “nickname” or an “alias” to send e-mail to several people.</td>
<td>o</td>
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<tr>
<td>send a document as an attachment to an e-mail message.</td>
<td>o</td>
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<tr>
<td>keep copies of outgoing messages that I send to others.</td>
<td>o</td>
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<tr>
<td>use an Internet search engine to find Web pages related to my subject matter interests.</td>
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<tr>
<td>search for and find the Smithsonian Institution Web site.</td>
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<tr>
<td>create my own World Wide Web home page.</td>
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<tr>
<td>keep track of Web sites I have visited so that I can return to them later. (An example of using bookmarks.)</td>
<td>o</td>
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<tr>
<td>find primary sources of information on the Internet that I can use in my teaching.</td>
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<tr>
<td>use a spreadsheet to create a pie chart of the proportions of the different colors of M&amp;Ms in a bag.</td>
<td>o</td>
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<td>create a newsletter with graphics and text in 3 columns.</td>
<td>o</td>
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<tr>
<td>save documents in formats so that others can read them if they have different word processing programs.</td>
<td>o</td>
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<tr>
<td>use the computer to create a slideshow</td>
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<tr>
<td>15</td>
<td>Create a database of information about important authors in a subject matter field.</td>
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<tr>
<td>16</td>
<td>Write an essay describing how I would use technology in my classroom/school.</td>
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<td>17</td>
<td>Create a lesson (presentation) or unit that incorporates subject matter software as an integral part.</td>
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<tr>
<td>18</td>
<td>Use technology to collaborate with other interns, teachers or students who are distant from classroom/school.</td>
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<tr>
<td>19</td>
<td>Describe 5 software programs that I would use in my teaching/presenting.</td>
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<tr>
<td>20</td>
<td>Write a plan with a budget to buy technology for my classroom/school.</td>
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APPENDIX C
NOTICE OF CONSENT
Consent Notice

Dear Colleague,

I am writing to request your participation in a research study which I am conducting as a part of my dissertation for my doctorate degree at The University of North Texas. The study will utilize quantitative research methods to examine the relationships among principals' levels of technology self efficacy and student achievement in reading. The study will also discuss the direct and indirect effects of principal's leadership characteristics (principal's self efficacy) in student achievement in reading. The goal of the study will add to the body of literature that focuses on self efficacy and technology/computer self efficacy.

The study will focus on the following questions.

1. Is there a relationship between principals' technology proficiency, principals’ personal and school demographic characteristics, and student achievement in select Texas high schools?
2. Is there a relationship between principals' self-efficacy, principals' personal and school demographic characteristics, and student achievement in select Texas high schools?

You are being invited to participate because you have been identified as a high school principal in Texas. If you are not currently a high school principal in Texas, please send me a return email at sbrown@desotoisd.org so that I can remove your name from the list.

The survey is available online at the link listed below.

If you would prefer a hard copy of the survey, please email Shelia Brown at (sbrown@desotoisd.org), and one will be emailed to you.

While we encourage you to participate so that we can have a complete picture of principal’s efficacy and principal’s technology efficacy and student achievement, your participation is voluntary and you may choose to end your participation at any time. In addition, your answers on the survey will be confidential and there are no foreseeable risks to you for your participation in the study. The researcher will have access to the key that links participant information to their coded responses; that key will be destroyed once data collection is complete. No identifying information will be included in any
dissemination of data. Data will be reported in the aggregate and not attributed directly to one person. The survey will take less than 10 minutes to complete.

This research project has been reviewed and approved by the UNT Institutional Review Board (IRB). Contact the UNT IRB at 940-565-3940 with any questions regarding your rights as a research subject.

If you have questions about this study, please contact Shelia Brown at 214-213-1264 or email me at sbrown@desotoisd.org. The faculty sponsor for this study is Dr. Richard Fossey, UNT Professor for the Department of Teacher Education and Administration. Contact information for Dr. Richard Fossey is (940) 565-2514 or rfossey@unt.edu.

Thank you,

Shelia Brown  
(Principal Investigator)  
The University of North Texas

Shelia Brown, Principal  
DeSoto High Freshman Campus  
DeSoto, TX 75115
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