TECHNOLOGY LEADERSHIP, SCHOOL CLIMATE, AND TECHNOLOGY

INTEGRATION: A CORRELATION STUDY IN K-12 PUBLIC SCHOOLS

By

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A DISSERTATION

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ABSTRACT

This study tested the relationship of technology leadership and school climate to the teachers' integration of technology.   In the 2008-2009 school year, data were collected using three instruments: the National Educational Technology Standards for Administrators (NETS-A) survey (administered to principals and assistant principals), the Taking a Good Look at Instructional Technology (TAGLIT) survey, and the Organizational Climate Index (OCI) survey (administered to teachers). It was hypothesized that administrators' leadership as measured by NETS-A would predict teachers' use of technology as measured by TAGLIT. In addition, it was hypothesized that administrators' leadership and a positive school climate as measured by the OCI both contribute to more integration of technology.

Respondents were 968 teachers and 44 administrators in 32 public schools with the school being the unit of analysis. Technological leadership from administrators was not associated with teachers' use of technology. Technological leadership was predictive of institutional vulnerability but not the other measures of school climate. Finally, achievement press, one of the measures of school climate, was negatively correlated, indicating schools with higher levels of achievement press tended to have lower levels of teachers' use of technology.

Recommendations for practice suggested that administrators improve skills by becoming more familiar with the International Society of Technology in Education (ISTE) standards for technology implementation and that technological innovations be more closely allied to in-class instruction and use focused program development to that end.

ii

DEDICATION

To Don, my husband and soul mate, I will forever be grateful for your help and encouragement as I pursued this lifelong dream. You were always by my side, lifting my spirits, making me laugh, and setting me back on track when working on "the paper" became overwhelming.

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CONTENTS

vii

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

THE PROBLEM

Introduction

World-wide, computer technologies have inundated society and are now considered commonplace in everyday life. Nearly all businesses use computers that involve daily tasks including managing inventory, tracking shipments, and monitoring the cost of their services and products. However, the use of technology in America's public schools has progressed at a much slower pace than that of the business world. Because schools are different organizations than business organizations, it may be that what predicts the implementation of technology in schools is a combination of leadership behavior on the part of the principal as well as a suitable climate in which the innovations will work.

During the past two decades there have been numerous initiatives from federal, state, and local school agencies to integrate technology in the curriculum. Nonetheless, not until 1999 when the federal government provided access to the Internet through e-rate funding did schools seriously consider adding technology.

Beliefs that technology holds the potential to provide the nation's youth with communication capabilities and proficiency skills needed to add value in a diverse and integrated society have pressured schools to incorporate technology into the curriculum. Since formal education began, no other educational tool has held the promise for changing our educational culture and enhancing student performance like technology (Brockmeir, Sermon, & Hope 2005; Golden, 2004).

1

Although Brockmeir et al. (2005) and others believed technology would create a revolution in education; similar claims have been made many times in the past. In 1842 Josiah Bumstead felt that the blackboard deserved to rank among the best contributors to learning and science. One hundred years later, in 1940, Hoban claimed that the motion picture was the most revolutionary instrument introduced into education since the printing press. A generation later, Woefle wrote that programmed learning was the first major technological innovation in education since the invention of printing. In 1967 Caffrey and Mossman urged that the impact of computers on society, and hence on the curriculum, has been compared to the impact of Gutenberg's printing press. In the same year, Stoddard promoted television as the greatest opportunity for the advancement of education since the introduction of moveable type to printing? (J. Daniel, 1997).

J. Daniel (1997) suggested that these exaggerated claims proved two things: one, the number of comparisons to the printing press points to printing being the greatest educational innovation of all time, and secondly, none of the claims have proven true over time. Nonetheless, technology today merges with all of the previously mentioned technologies to provide new ways to gather information and communicate with others.

Background of the Study

Changes are occurring in classrooms across America. These changes are an outgrowth of several larger trends influencing the nation's schools. These trends include school accountability, ensuring students' safety, changes in teaching methods from traditional to more constructivists, and the addition of technology in classroom. Also, as the circumstances of education have evolved, the administrative role has changed dramatically (Haughey, 2006; L. Thomas & Knezek, 1991; Valdez, 2004).

Purpose of the Study

According to Hodas (1993), "Technology is never neutral: the values and practices must always either support or subvert those of the organization into which it is placed" (p. 1). According to Robertson, Grady, Fluck, and Webb (2006), when promoting change brought on by technology, the school leader may do well to begin with the engagement of the school staff. The authors encouraged leaders to use real data to gage the social climate, the organizational culture, and/or the nature of interrelationships between its teachers, students, and the community. Leadership failing to acknowledge technology's impact on the educational setting may miss the opportunity to fully implement technology in the classrooms.

To provide more specificity between leadership and technology integration, the National Educational Technology Standards [NETS-A] for administrators was developed. These standards were collaboratively developed with the International Society for Technology in Education [ISTE]. The six standards identify knowledge and skills that constitute the core of what every P-12 administrator needs to know and be able to do with technology to effectively lead his/her faculty in integrating technology.

The assumption of these standards is that administrators should be competent users of information and technology tools common to information age professionals (ISTE, 2002). Further, the NETS-A will serve as the operational definition of technical leadership and as a logical extension of the leadership espoused by Fullan (2002), Senge (1990), Yukl (2006), and others who have argued for improved leadership in the area of technology change.

The school climate as an independent variable contributes to change and works jointly with leader behavior. The climate of the school captures an element of the informal organization and describes the milieu through which technical leadership will function in order to accomplish

the implementation of technology. Climates that are open and healthy (Hoy & Sabo, 1998) should be climates conducive to change.

The complexity of bringing change to the school climate presents challenges for the leader. Fullan (2001) argued that in order to be effective, leadership must have and work on improving his or her moral purpose. Moral purpose is about how human beings strive to improve the quality of how we live together. Leadership for technology integration must address teachers' intrinsic commitment or moral purpose to improve student learning. Thus, effective leaders initiating change in organizations must be aware of the informal climate and should strive to cultivate making-a-difference sense of moral purpose among the faculty to ensure the sustainability of technology integration.

<div align="center">Significance of the Study</div>

Theoretical Significance

The study attempts to demonstrate how leadership behavior and school climate explain the implementation of technology.

Practical Significance

Any administrator who faces the problem of implementing existing technologies into the curriculum should want to know about leadership behaviors and school climates that offer insight for successful technology integration in the classroom.

<div align="center">Definition of Terms</div>

Technology Leadership (ISTE NETS-A, 2002): The National Educational Technology standards for Administrators (NETS-A) identified knowledge and skills constituting the core of what every K-12 administrator needs to know about and be able to do with technology regardless of specific job roles. These are represented as six "standards": (1) Leadership and Vision**;** (2)

Learning and Teaching; (3) Productivity and Professional Practice; (4) Support, Management, and Operations; (5) Assessment and Evaluation; and (6) Social, Legal, and Ethical Issues.

Campus-level leaders are principals and assistant principals in K-12 schools.

School climate (Hoy & Miskel, 1996) is a broad term that refers to teachers' perceptions of the general work environment of the school; it is influenced by the formal organization, informal organization, personalities of participants, and organizational leadership.

Organizational Climate Index (OCI) (Hoy & Miskel, 1996): The Organizational Climate Index (OCI) will be used to measure climate in schools. The OCI has four dimensions: principal leadership, teacher professionalism, achievement press, and vulnerability to the community.

Teacher technology integration: For the purpose of this study, teacher technology integration will be defined as the teachers' use of technology, including the teachers' technology skills, the teachers' use of technology, and the teachers' use of constructivist pedagogies as reported on the TAGLIT survey.

Technology integration and implementation are defined as the incorporation of technology and technology-based practices into the daily routines, work, and management of an organization (Institute of Educational Sciences [IES], National Center for Educational Statistics, 2006).

Technology refers to personal computers, networking devices, and other computing devices (e.g., electronic whiteboards and personal digital assistants [PDAs]; also includes software, digital media, and communications tools such as the Internet, email, CD-ROMs, and video conferencing (UCEA, Center for Advanced Study of Technology Leadership in Education, n.d.).

Technology in schools can be defined as the full range of computer and computer-related equipment and associated operating systems, networking, and tool software that provide the infrastructure over which instructional and school management applications of various kinds operate (Institute of Educational Sciences [IES], National Center for Education Statistics, 2006)

TAGLIT: Taking a Good Look at Instructional Technology (TAGLIT) is a suite of assessment tools designed to help principals and other school leaders gather, analyze, and report information about how technology is used for teaching and learning in their schools (Cory, 2001).

Teachers' Technology skills are defined as how far along teachers see themselves on learning to use technology tools in four areas on the teacher's TAGLIT survey. (1) basic tools (word processor, spreadsheet, data base); (2) multimedia tools (drawing/painting software, digital camera/scanner, presentation software, multimedia software); (3) communication tools (email, web authoring software); and (4) research and problem-solving tools (CD-ROMS, search engines, graphic organizers) (Cory, 2001).

Teachers' constructivist pedagogies: Constructivist pedagogies are defined as the way the classroom works for teachers who use technology in teaching and learning (Cory, 2001).

<div align="center">Research Questions</div>

To address how the two constructs of technology leadership and school climate work together to promote integration, the related literature review led to positing the following research questions:

RQ1. Will campus-level technology leadership form a composite positively related to teachers' technology integration?

RQ2. Will campus-level leadership and school climate form a composite positively related to teachers' technology integration?

RQ3. Will campus-level leadership and school climate contribute to teachers' technology integration skills and use and constructivist pedagogies?

Scope and Limitations

This study is subject to the following limitations:

1. There may be unexamined factors affecting progress toward integrating instructional technology into the curriculum that was not accounted for in the study.

2. The results of the study must be generalized with caution because one school district located in Georgia, Clayton County Public Schools, was used.

3. The accuracy of campus-level leaders' responses depended on their ability to recall their perceptions of past behaviors and current resources.

4. This study is designed to discover relationships among the variables. It is not an attempt to establish cause-effect relationships.

5. This study is cross-sectional so longitudinal generalizations should be made with caution.

Summary

This study offers technology leadership behaviors and explains the type of school climate necessary for integration of technology in our schools. This study provides empirical data that examines the leader's behaviors in the light of the NETS-A standards and accessing the school climate on how these variables can contribute to or detract from teachers' technology integration. Ideally, this study will provide data to help leaders develop programs that will enable them to become more effective as they integrate technology in their schools.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

This chapter reviews the research history of leadership applied to technical innovation, climate, technical implementation, and pedagogical techniques. A theoretical framework describing how leadership and climate affect implementation is offered. Finally, hypotheses are presented that test the theoretical framework.

Conceptual Framework

The technological leadership of the principal, the climate of the school, and the degree of technological implementation drive this study. This section deals with the research history and importance of those concepts respectively.

Technological Leadership

This study examines the leadership behaviors and skills that contribute to managerial effectiveness and advancement of technological implementation. Technology leadership shares much with research on leadership in general. It is the purpose of this study to examine the specific leadership knowledge and abilities involved in technology leadership. The role of the leader, according to Cuban (2001), suggests that the manner in which technology is implemented is more important than the technology's intrinsic value.

Also, technology leadership is linked to change, and this aspect deserves special attention. Enhancing technology in schools is a substantive systematic change and depends greatly on the capability of building level leadership (Brooks-Young, 2002; Fishman, Gomez, &

Soloway, 1999; Haughey, 2006; ISTE, 2005; Kearsley & Lynch, 1994). Systematic change

efforts in the schools do not succeed without building level leaders' active involvement (R.

Anderson & Dexter 2005; Costello, 1997; Dawson & Rakes, 2003). Whereas leadership usually

involves dealing with some change, leadership in technology always involves new procedures,

policies, and situations (Kearsley & Lynch, 1994).

The first part of the literature review provides a brief history of educational leadership

and the current state of leadership behaviors and strategies that most likely will lead to effective

technology integration. Secondly, a discussion defines technology leadership in terms of

NETS-A (a suggested leadership guide) as a conceptual and operational definition of leadership

that connects broadly to the organizational context. Lastly, the study shows how technological

leadership works with a healthy and open school climate to predicate technological

implementation.

<center>Leadership</center>

The concept of leadership has many definitions. Researchers cannot agree on one

common definition. Yukl (2006) defined leadership as "a process of intentional influence exerted

by one person over others to accomplish a goal" (p. 3). Administrators leading in today's

educational setting must sustain a continuous effort to meet the needs of all educational

communities. Leadership, while addressing curricula, instructional practices, staff needs, and

managerial tasks are now faced with implementation of new technologies (Brooks-Young,

(2002).

Webber (2003) suggested that the challenges and opportunities associated with

technology call for educators to come to terms with the educative potential of technology and

how it has altered the skills needed to lead effectively. Because technology is changing the way

<center>9</center>

educators work, the effective leader should develop the skills to best use and communicate technology. The question becomes, what leadership style or strategies would best serve a principal in linking changes brought on by technology to educational leadership?

<div align="center">Leadership Strategies</div>

One of the earliest efforts to study leadership is the trait theory. This theory was based on the assumption that some traits and skills are a predictor of a person's leadership effectiveness. Many studies were conducted to identify physical characteristics, personality traits, and skills of people that contributed to managerial effectiveness and job advancement (Smith & Piele, 1997).

Although these studies attempted to identify the physical characteristics, personality traits, and abilities of people that lead effectively, the list becomes too long to be effective. The early research failed to examine two essential questions: how do traits interact with the person's personality, and how does the situation determine the leader's effectiveness (Yukl, 2006)? However, the importance of the trait approach is that it has led to increased managerial effectiveness, which focuses less on traits that predict who will become a leader and more on a combination of factors in a given situation.

Over a period of several decades, researchers were able to identify a number of skills that are linked to managerial effectiveness. A widely accepted taxonomy of managerial skills by Katz (1955, as cited in Yukl, 2006, p 181) included three broad categories: (1) technical skills primarily concerned with things such as techniques or a specialized activity, and the ability to use tools and equipment; (2) interpersonal skills primarily concerned with people interested in the understanding of feelings, attitudes, and ways to motivate people, and (3) conceptual skills primarily concerned with ideals and concepts, such as creative problem solving of potential problems.

Leithwood, Jantzi, and Steinbach (1999) suggested that there are six leadership strategies in education that should serve as starting points for leaders facing challenges and changes such as those associated with technical leadership. These strategies are managerial, instructional, transformational, moral, participative, and contingent. Each strategy has its distinct advantages and shortcomings. These strategies along with other leadership theories are discussed in the following section.

Leithwood et al. (1999) suggested that managerial leadership has its roots in positional power combined with formal policies and procedures. Managerial motivation in leaders includes socialized power, moderate need for achievement, and less need for connection. The managerial leader is most effective by ensuring that clear defined goals set forth by the organization are achieved.

Combined with the trait approach, managerial effectiveness has important implications for identifying effective managers. Information about a person's traits and skills can assist in matching and promoting individuals to high level positions. The success of leaders employing these technical skills depends on the type of organization, the level of management, and the nature of the challenges confronting the leader (Yukl, 2006).

One leadership style that has endured over time is hierarchal. Hierarchal strategies exemplify a top-down, highly efficient, structured approach that emphasizes authority and control. The leader's power is based on the position he or she occupies in the organization. Deal and Peterson (1994) referred to hierarchal leadership as a leader that plans, secures resources, coordinates, and closely supervises all aspects of the school. This strategy is effective because of its efficiency and is the most popular leadership style used in today's schools.

However, Riley (2000), Crowther (2002), Gurr (2004), and Downes (2005) suggested that in technological environments hierarchal leadership strategies may not lend themselves well to the complexities involved in networked schools. Two reasons sited by Deal and Peterson (1994) were that (1) hierarchy leadership strategies tend to lessen creativity, and (2) the hierarchical leadership style produces less commitment among staff.

At the height of popularity in the 1980s and up to today, the instructional leadership strategy has and continues to play an important role in school reform. The term *instructional leadership* has no definitive meaning; however, research in the past two decades has identified some common elements that are fundamental to instructional leadership. These aspects are (1) defining and communicating goals, (2) monitoring and providing feedback on the teaching and learning process, and (3) promoting and emphasizing the importance of professional development (Alig-Mielcarek & Hoy, 2004, p. 29).

Instructional leadership is critical for student achievement. However, according to Alig-Mielcarek and Hoy (2004), the majority of the research suggests that principals will be more effective in enhancing student achievement if they spend time developing school climate. The kind of school climate that leaders create should emphasize a strong academic press, listening to teachers, and providing continuous staff development (Alig-Mielcarek & Hoy, 2004).

A leadership style that proved to be highly effective during the 1960s and 1970s, especially in urban school districts, is transformational leadership. Transformational strategies promote and motivate followers especially during times of change. Burns (1978) described transformational leadership as leadership that appeals to the moral values of followers in an attempt to raise their consciousness about ethical issues and to mobilize their energy and resources to reform institutions.

Transformational leadership has brought an enriched view of leadership from the 1980s onward. Burns (1978) suggested that this leadership strategy inspires followers through his or her demonstration of commitment and through effective communication of expectations. Unlike hierarchal leaders, transformational leaders operate under few rules and regulations. They take the lead role in identifying and articulating the vision for the school. Transformational leadership can be thought of as a set of behaviors of individuals who accomplish change (Valdez, 2004).

Bass and Riggio (2005) described transformational leaders as self-confident and self-determined. They know what they want and are convinced they can get it. Yukl (2006) suggested that transformational leadership is likely to be more effective in a dynamic, unstable environment that increases the need for change. Implementing technology in a school can be categorized as such an environment, one that initiates change and may benefit from transformational leadership behaviors.

Leithwood (1994) led a 4-year study of schools undergoing structural change and found that there is "reasonably robust support for the claim that transformational forms of leadership will be of considerable value in the context of a school-restructuring agenda" (p. 515). He developed a model that conceptualizes leadership along the following dimensions: building school vision, establishing school goals, providing intellectual stimulation, offering individualized support, modeling best practices and important organizational values, demonstrating high performance expectations, creating a productive school culture, and developing structures to foster participation in school decisions.

According to Burns (1978), transformational leadership is more than technical efficiency; it must meet the needs of the followers. Bass and Riggio (2005) suggested that good

transformational leaders have good insight and are skillful motivators. They are charismatic leaders and can influence the way their followers view the world.

A leadership style similar to transformation is called facilitative leadership. Although it is a relatively new leadership approach, Lashway (1997) argued that the concept evolved from transformation leadership theory and the terms are often used interchangeably. Conley and Goldman (1994) defined *facilitative leadership* as "the behaviors that enhance the collective ability of a school to adapt, solve problems, and improve performance" (p. 1). According to Sergiovanni (1992), this strategy with its emphasis on collaborative school-wide issues offers teachers the advantage of participating in the development of shared values and a buy-in commitment of collegiality.

The leader's role in the facilitative strategy is not to solve the problems personally but to see that the problems are solved. Sergiovanni (1992) pointed to the difficult work involved in getting a faculty to work in a collaborative mode; however once accomplished, schools conclude with a unified program where relationships are strengthened and enriched. This strategy, offering shared decision making, may be well suited to the implementation of technology in the educational arena of today.

Moral or ethical leadership style is a concept that is not easily defined. It has its roots in scientific discipline. One reason it is difficult to define is that it often depends on the individual leader's values, stage of moral development, conscious intentions, freedom of choice, and use of ethical and unethical behavior (Yukl, 2006).

Research in the area of ethics for leaders has for the most part been conducted within the social-science field, which deals with more objectivity on cause-and-effect relationships instead of the more subjective questions of what should be done (Lashway, 1997). Beck (1992)

14

suggested for a long time that ethical issues were overlooked in the profession and ignored in the preparation programs.

Recently, according to Greenfield (2004), educational thinkers are taking a new look at school leadership as a moral art. Greenfield argued that school leaders face a unique set of ethical demands involving students, and for these reasons their actions should be deliberately moral. Sergiovanni (1992) suggested that moral leadership revolves around a covenant, a shared sense of purpose that forms the basis for all actions and decisions. In schools with covenants, teachers share beliefs about what students need, and furthermore they hold the leader and one another accountable for these beliefs. Thus, school leaders facing day-to-day decisions should have a clear understanding of how moral values affect the school's policies, practices, and structures (Lashway, 2003).

Another strategy referred to as *participative leadership* involves the use of various decision procedures that allow other people some influence over the leader's decisions. Other terms commonly used to refer to participative leadership include *consultation, joint decision making, power sharing, decentralization, empowerment,* and *democratic management* (Yukl, 2006).

Participative leadership, according to Yukl (2006) involves a number of people making the decisions that will affect them. Participative leadership is a distinct type of behavior with proposed procedures. However, researchers cannot agree on the optimal number of decision procedures or the best way to define them.

Even with the limitations of agreement on number of decision procedures, participative leadership still has potential benefits. Liontos and Lashway (1997) suggested that participative

leadership increases the quality of decisions, increases the acceptance and implementation of the decisions, strengthens staff morale, and builds trust.

Hoy and Miskel (2008) described an evolution of leadership to contingency theories of leadership. The contingency approach professes that it is necessary to specify the conditions, or situational variables that temper the relationship between leader behavior and performance outcomes (Hoy & Forsyth, 1986). Two of the most well known contingency models are Fred Fiedler's contingency model and Hersey and Blanchard's (1993) situational theory. Fiedler's (1968) model is based on two concepts: (1) leadership style is determined by the motivational needs of the leader; and (2) group effectiveness is a function of the relationship between leadership style and the leader's ability to exert influence over the situation. Hersey and Blanchard's (1993) situation theory suggests that type of leadership depends on the situation. Rather than a mix of goal-oriented or group-oriented behaviors, effective leadership depends on a match between leader behavior and characteristics of the situation.

After World War II, two dimensions of leadership emerged: task driven and human oriented (Smith & Piele, 1997). These two basic sets of needs that motivate leaders are the leader's need to accomplish tasks and the need to develop interpersonal relationships. Task-driven behaviors attempt to accomplishment a task through processes of evaluating, monitoring, using resources, and work planning, which lead to goal attainment. Human-oriented or interpersonal leaderships draw on the human resources of the organization for teamwork, cooperation, motivation, and morale to aid in the accomplishment of the task (Yukl, 2006). These two behaviors figure prominently in the leadership literature and are interpretable in the NETS-A Standards. These standards will be discussed extensively in this study.

16

Blake and Mouton (1985) captured the concepts by defining *task orientation* as leadership that is mainly concerned with day-to-day organization and managing, and *relationship orientation* as concerned with building mutual respect and trust between leaders and subordinates. From the 1950s to the mid 1980s researchers focused on the distinction between task-oriented behavior and people-oriented behavior (Fleishman, 1953; Halpin & Winer, 1957, as cited in Yukl, 2006). Hundreds of studies utilizing questionnaires, observations, and surveys were used to measure leadership behaviors as either task or relationship orientated. The results of this research effort have been inconclusive, revealing that the effect of the two values varied and was often dependent on the situation. Thus, when considering effective strategies necessary to bring technology implementation to schools it is necessary to study the specific behaviors in the task and the relationship categories rather than merely looking at the larger categories.

According to Yukl (2006), bringing change to an organization is one of the most important and difficult responsibilities a leader will face. Effective change requires a wide range of leadership behaviors. Yukl grouped these behaviors into two categories, called political/organizational actions and people-oriented actions. Political actions include identifying supporters and opponents, creating a coalition, and forming teams to guide the implementation of changes. People-oriented actions include creating a sense of urgency, preparing people for change, helping them cope with change, and empowering people to help implement the change.

The fundamental point of the preceding discussion of the kinds of leadership strategies and skills is that they are essential to ensuring the potential benefits of technology implementation. According to Kearsley and Lynch (1994), technology is inherently linked to innovation. They suggested that although in general, leadership theories, strategies, and skills are

necessary, they are not totally sufficient when it comes to technology implementation; specific technical knowledge is also required.

To guide this discussion on technical leadership it is important to consider how technology interacts with leadership structures, and in turn how leadership might influence technology implementation. In the next section this study offers additional strategies of specific behaviors related to technology that will help the technology leader to become more skilled in conceiving technical solutions in the educational setting.

<div align="center">Technology Leadership and NETS-A</div>

Technology Leadership, for the purpose of this study, is defined as the level of administrator technical knowledge along with school climate in explaining the implementation of technology in the classroom Technology leadership encompasses the knowledge and a skill constituting the core of what every K-12 administrator needs to know about and be able to do with technology regardless of specific job roles.

<div align="center">NETS-A Standards</div>

Specific behaviors used to assist administrators in increasing technology leadership effectiveness and providing guidelines to assess their expertise are contained in the NETS-A, proposed by the International Society of Technology in Education (ISTE) in 2002. These standards target a wide variety of technology issues, but for the purpose of this research, the focus will be on the standards for technology leadership learning. Originally the standards for school administrators were developed through ISTE (2002), called the Technology Standards for School Administrators (TSSA), and released in 2001. In 2002, they were integrated into the NETS-A and widely promoted. The NETS-A standards are grouped into six sections: (1) Leadership and Vision, (2) Learning and Teaching, (3) Productivity and Professional, (4)

Support, Management, and Operations, (5) Assessment and Evaluation, and (6) Social, Legal, and Ethical Issues.

Flanagan and Jacobsen (2003) and Creighton (2003) suggested that technology leadership is much more than acquisition and management of equipment or software, but instead how leaders can influence and empower teachers to provide ongoing technical learning with their students. This section of the review will provide an overview of the six NETS-A standards as proposed guidelines for technical leadership. The intent is to show how the six standards are embedded in the educational leadership theories mentioned in the preceding section. The standards are representative of the type of leadership behaviors that, if adhered to, will tend to enhance the skills needed to effectively integrate technology. In order to guide principals in accomplishing the many tasks required on a daily bases, the K-12 public school system has moved toward establishing standards of professional leadership behavior. Without standards, school administrators, schools of education, and state agencies are limited in their ability to provide the needed proficiency in school activities (International Society of Technology in Education, 2002).

In standard I of the NETS-A, Leadership and Vision, leaders are to "facilitate…a vision for technology use and widely communicate that vision" (Brooks-Young, 2002, p. 11). The successful leadership for technology involves understanding the nature and challenges of technology and having the ability to develop and articulate a vision for the schools. According to Flanagan and Jacobsen (2003), the forceful impact that technology integration brings to the classroom requires support by visionary and knowledgeable leadership. Manasse (1985) defined *vision* as the force that molds meaning for the people of an organization (p. 150). Byrom and

19

Bingham (2001) found that the states, districts, and schools with the most successful technology programs were those led by visionary governors, legislators, and committed leaders.

Standard 1, Leadership and Vision, embraces the leadership approach of the theory of transformation leadership. Transformational leadership places the focus of leadership on the commitments and capacities of the organizational members (Leithwood, 1994). Transformational leaders are able to instill feelings of trust, admiration, loyalty, and respect within their followers. According to Bass (1985) the transformational leader transforms and motivates subordinates by (1) making them more aware of the task outcomes, (2) inducing them to transcend their own self-interest for the sake of the organization, and (3) activating their higher order needs.

The International Society of Technology in Education (2002) suggested that the first standard, Leadership and Vision, requires leadership that takes responsibility for shaping the school's culture by creating and articulating a vision to the staff. The transformational leader should involve stakeholders during the development of the technology vision, as this will foster commitment and support for the school's technology plan (Costello, 1997; L. Thomas & Knezek, 1991). Although, the real source of the vision must come from the teachers as a group, the transformational leader takes responsibility for identifying and communicating that vision (Leithwood & Montgomery, 1982).

Further linking technology implementation to the transformational style, Slowinski (2000) suggested that leaders utilizing this style increases teacher motivation and performance, allowing the leader to communicate an appealing vision of what full technological implementation will look like in the school. He stated, "The technology plan is driven by the school vision rather than by the technology itself" (p. 4). It is the leader's responsibility to ensure

that the resources, coordination, and climate are in place for the technology plan to be realized (International Society of Technology in Education, 2002).

The general literature on technology leadership and educational leadership posits recurring themes of visionary and cultural dimensions of leadership as fundamental to technology integration. Crowther (2002) and Fullan (2002) argued that visionary leadership is needed in educational change. Staples, Pugach, and Himes (2005) and Tong and Trinidad (2005) presented similar findings on the importance of leaders providing the vision necessary for technology integration.

Bozeman and Spuck (1991) emphasized that leaders are expected to have the knowledge and proficiency of how integrating technology in the classroom supports the needs of the students. NETS-A speaks to this concern in Standard 2, Learning and Teaching. Responsibility falls to the leaders to recognize and provide a learning environment that fosters collaboration, higher level thinking skills, and creative learner activities that involve technology (International Society of Technology in Education, 2002).

In looking at the central ingredient leading to effective leadership, such authors as Hallinger and Murphy (1988) and Leithwood, Lewis, Anderson et al. (2004) suggested that the key element is defined by student achievement. Rhodes (1994) suggested that student outcomes must be the driving force that shapes all decisions made about change. According to Murphy, Elliott, Goldring, and Porter (2007), this type of leadership demands that the leader stay consistently focused on the core of schooling.

Principals who understand the instructional application of technology must be able to move the entire learning community toward changes in the curriculum and the specific uses of

technology. Rhodes (1994) argued that it is the principal's task to help everyone involved in the process to envision the creation of successful learning environments.

The instructional leadership theory is closely linked to Standard 2 of Teaching and Learning. Instructional leadership requires the leader to possess expert knowledge and be able to influence the educational communities by enhancing teacher effectiveness and promoting student growth (Leithwood et al. 1999). According to Alig-Mielcarek and Hoy (2004) an instructional leader's responsibilities also include communicating goals, monitoring and providing feedback, and with providing relevant staff development. Although leadership for learning remains the focus, having an understanding of how an innovation, in this case the integration of technology, is accepted into the culture of the faculty proves to be a challenge for leaders.

Perez and Uline (2003) suggested that principals must examine computer use from a problem-solving perspective. In their study to understand the relationship between how school leaders think about and act on technological capacity to enhance learning, they found that the educational leader made a vast difference in how their teachers coped with both existing and emergent technologies. Brooks-Young (2002) agreed that administrators wanting to provide an environment where technology is fully integrated should facilitate and support collaborative technology conducive to innovation for improved learning.

The NETS-A Standard 3, Productivity and Professional Practice, encourages leaders' use of technology to increase productivity and to model ways to effectively use technology (International Society of Technology in Education, 2002). A prerequisite to instructional and administrative technology is the principal's increased computer awareness and technology comfort (Kearsley & Lynch, 1994). Research in the area of technology leaders' skills recommends that administrators model desired behavior by being familiar with and using

technology themselves (Baylor & Ritchie, 2002; Hall, Rutherford, Hord, & Huling, 1984; Kincaid & Feldner, 2002; L. Thomas & Knezek, 1991). To accomplish this, according to Brooks-Young (2002), administrators must first be willing to examine honestly their expectations for themselves and their staff. Second, they need to develop an accurate picture of how technology can improve their work and work environment.

Bozeman and Spuck (1994) suggested that educational technology leaders be able to use technology to solve real problems in their schools. Brooks-Young (2002) suggested that some real school problems that should be addressed using technology include the following: communication and correspondence; the use of applications in word processing, desktop publishing, spreadsheets, data-based applications; and the use of web-based applications. In Standard 3, according to Brooks-Young (2002), administrators should most want to accomplish ways to nurture and support teachers in understanding net applications for technology use, while at the same time modeling the use of technology themselves. In Standard 3, the leader is responsible for assessing how technology is currently employed for communication and collaboration among all stakeholders and determining how to accomplish this (Brooks-Young, 2002). Administrator behaviors associated with task-driven leadership skills are needed.

According to Yukl (2006), the leader's aim is task-driven as he or she decides what needs to be done and how to best accomplish the tasks. In Standard 3, the leader can be productive as he or she models and leads others to accomplish technology tasks. The tasks to accomplished in Standard 3 are the following: (1) establishing clear lines of expectations about methods of communication to both faculty and community, (2) having an understanding of the various forms of technology-based communications, (3) establishing incentives for staff to use technology-

based communication, and (4) evaluating the effectiveness of on-site communication to accomplish intentional effective use of technology (Brooks-Young, 2002).

Another important aspect of Standard 3 is the responsibility of the administrator to ensure that the faculty is given time (Kearsley & Lynch, 1994) for professional development opportunities. According to Brooks-Young (2002), experts recommend 15-60 hours annually to train teachers in effective technology use. This is an important component of instructional leadership, and effective technology leaders find ways to provide and sustain professional development.

Section 4 of the NETS-A, Support, Management, and Operations, specifies the terms that are involved in ensuring that a system is in place to support technology use in the school. That technology not only supports the management of such systems but also supports coordinating and allocating decisions of spending for equipment, networks, software, staff, and support services of all types (International Society of Technology in Education, 2002). Most of the literature in this area is vague concerning the principal's duties; however, MacNeil and Dalafield (1998) posed access to equipment for staff as a top priority. Others stressed the seeking of funding to provide equipment and establishing an ongoing budget for technology as a priority (Costello, 1997; Kearsley & Lynch, 1994; L. Thomas & Knezek, 1991).

With the success of the technology program in mind, the principal addressing Standard 4 should allocate financial and human resources to ensure and sustain technology integration (Brooks-Young, 2002). Initiatives such as the federal government E-Rate have made it possible for all schools to install networks with Internet connections. Purchasing new equipment, software, sustaining the up-to-date technology, and providing technical support has placed

demands on leadership. Unresolved cost and incompatibility of software can prevent successful implementation.

Standard 4 involves specific strategies that are linked to the managerial leadership style. The administrator should be familiar with specialized activities and have the ability to use tools and equipment (Katz, 1955, as cited in Yukl 2006). Technology leaders should know how to assess their schools' technology level and have the skills to efficiently manage hardware and software issues. According to Leithwood (1994), managerial leadership, grounded in the formal role, ensures that leaders can communicate appropriately about the most efficient way to handle the technical aspects of technology.

In the NETS-A Section 5, Assessment and Evaluation, the involvement of technology leaders in an ongoing assessment of their own administrative uses of technology and those of their faculty is imperative. The crux of this standard involves continuing evaluation as needed to prepare for professional development (Dempsey, 1999). It is especially important for technology leadership to critically evaluate existing and new technology. However, Brooks-Young (2002) pointed out that when evaluating technology use in learning it must be evaluated within the context of overall educational programs or school reforms. With this in mind she suggested that educational leaders use multiple methods to assess and evaluate technology implementation.

Social, Legal, and Ethical issues associated with educational technology are emphasized in NETS-A Section 6. Standard 6, states that educational leaders should work to ensure equal access, the safety of users, and compliance with social, legal, and ethical practices related to technology use (International Society of Technology in Education, 2002). Echoing ISTE, Kearsley and Lynch (1994) argued that principals must be aware of and work to ensure equitable access and opportunity to technology resources.

Pereus (2001) warned leaders of the legal and ethical considerations that must be taken into account when purchasing technology. Acquisitions, vendor assessments, product testing, site visits, cost analysis, functionality, and final costs must be seriously considered before investing in technology. Bailey and Lumley (1993) pointed to the leader's responsibility in the involvement of possible dilemmas that adding technology poses. Leaders must be fully aware of the security issues surrounding technology and its capabilities.

Standard 6 of the NETS-A draws on the concepts promoted in the moral leadership style. According to Greenfield (2004), in a school, the challenge for the principal is to foster an increasing number of shared commitments on a moral level among the broadest possible range of participants. Principals successful in providing these conditions will enable students and teachers to do the right thing.

Identification of the behaviors in the six NETS-A standards provides principals the means to measure the degree to which they possess the behavior. They also establish a framework for the creation of leadership profiles in organizations. Each of the leadership behaviors mentioned identifies important behaviors that will aid leaders in understanding technology leadership effectiveness in schools. The NETS-A 6 Standards for leaders exemplify technology leadership behaviors that have been developed in relation to leader effectiveness.

Principals leading their schools in technology implementation should understand the strengths and weakness of various technologies as well as the issues underlying any application of instructional technology. In order to address this wide array of topics, leaders should combine the theory and practice of leadership strategies with the proposed strategies of NETS-A to ensure the effective use of technology in our educational system.

In 2002, the ISTE published a guidebook to further aid administrators in implementing the NETS-A six standards called, *Making Technology Standards Work for You: A Guide for School Administrators,* written by Susan Brooks-Young. This book provides strategies to assist school leaders in school reform, particularly as it relates to technology use.

In her dissertation, Yoho (2006) addressed the NETS-A standards as a predictor of implementation in a quantitative study that asked 25 administrators to describe their efforts in terms of the six NETS-A standards. The NETS-A elements proved useful in interpreting their successes and failures. Her research indicates the effectiveness of linking the behaviors described in the standards to successful innovation, which is, of course, the major theme of the work at hand.

Knezek (2002) argued that the most effective integration of technology begins by staying focused on the knowledge about what we already know about leadership for educational change. He suggested that a framework for effective change be characterized by a shared vision and clear expectations, support strategies and essential conditions, ongoing broad-based assessment and evaluation, and meaningful and substantial response to assessment and evaluation findings. This framework presented by Knezek and other leadership models parallel the standards presented in NETS-A. Working from leadership theoretical underpinnings, the NETS-A is used in this study as a measurement of instructional leadership.

Finally, Jim Bosco (2001), the chairman of the collaborative who wrote the NETS-A, stated that four elements must be in place if technology integration is to be effective: (1) computers must be in place, in good condition, and of good quality to make a difference; (2) teaching programs, software, and Internet access must be available; (3) the teachers must have knowledge of and be able to use the equipment to teach and to bring the full capabilities of the

27

computer to the educational setting; and (4) the final basic element and the one that can determine the success of the whole program is the leadership of the school principal. The fourth critical element, principal leadership, has often been neglected, and this fact led the collaborative to develop the NETS-A.

In summary, Valdez (2004) highly recommended that school principals who want to make technology integration effective in their school should seriously consider adopting the National Educational Technology Standards for Administrators. Creighton (2003) agreed with Valdez and strongly recommended NETS-A, as he stated, "All school administrators should become familiar with, and utilize, the set of standards developed by the Technology Standards for School Administrators (TSSA) collaborative" (p. 7).

Challenges Related to Technical Leadership

Before beginning full technology implementation, principals should be aware of the challenges and barriers that are inherent in most technology programs. These challenges can easily undermine the confidence of even the most seasoned leaders (Lashway, 2003). According to Kearsley and Lynch (1994), topics and phrases such as leaders as change agents, leaders as facilitators, and leading change in the school reform, emphasize the increasing challenges leaders confront in defining their new role. Although there is more knowledge available to leaders in addressing problems, there are increasingly more adaptive challenges that go beyond the current way of operating.

Some of the major challenges for leadership involve identifying the right time as well as setting the pace for implementation, understanding how technology implementation affects the different learning communities and the continuation of the integration process even if funding is lost (Leithwood & Montgomery, 1982). Although others at the district and school level are often

28

involved in the technological implementation process, the principals' influence over the school places them at the center of the integration process (Kearsley & Lynch, 1994).

Many principals are eager to implement technology; however they often lack the skills to do so. R. Anderson and Dexter (2005) suggested that rapid changes in technology and highly uneven distribution of expertise make technological leadership particularly demanding. The challenge lies in possessing the skills to steer the technical process in the right direction. According to Flanagan and Jacobsen (2003), many principals have not been prepared for the role of technology leader and struggle to develop both the human and technical resources to achieve full implementation.

Schiller (2003) posed another challenge, suggesting that although the principal's leadership is critical to nurturing an environment in which technology innovations benefit student learning, constructing this environment presents a dual dilemma. Not only is the school leader challenged by technology implementation, but at the same time he or she must handle school reform that is inherent in effective technology competency. Motivating and convincing all stakeholders to change traditional teaching methods of instruction and embrace new techniques is a major challenge. According to Kearsley and Lynch (1994), leadership with a strong focus toward the needs of the school should provide the influence needed to lead to technology implementation. However, if the great majority of teachers do not respond to the changing instructional practice of using computers, then moving the school toward full implementation presents a challenging circumstance even for the most able leaders.

Another challenge many principals face is their resistance to share the decision making process. Brockmeir et al. (2005) gathered data from 268 principals in Florida that revealed that 59% considered that their technology competency and knowledge equipped them to be effective

technology leaders. However, the results revealed that half of the principals surveyed were unwilling to share decision-making about technology with the teachers. This supports the idea that principals exercise leadership in areas where they are unqualified, yet because of their traditional role expectations, they do not want to relinquish decision-making power concerning technology to teachers.

One of the greatest challenges incurred by most principals when implementing technology is a lack of training by their respective school. Kearsley and Lynch (1994) reported that most of the time higher education uses the dual approach to teaching and using technology. In other words, technology is taught within a subject area by individual teachers or professors dabbling in computer instruction. Curriculum agendas in many higher education classes reflect technology use but without the implementation of a hierarchal vision of that institution in the area of technology.

In developing the NETS-A guidelines, ISTE (2002) suggested that building-level principals are held accountable for (1) creating and implementing a technology curricula; (2) ensuring that teachers and students have the opportunity to obtain skills in technology; (3) communicating to parents the opportunities available to students in this area; (4) creating a teacher evaluation instrument that assesses teacher proficiency in integrating technology into the curriculum; and (5) serving as the chief recruiter in attracting teachers with technology skills

The stakes are high, but administrators realizing the promise of technology can navigate the accountability environment. Through the guidelines proposed by NETS-A, the principal can assume leadership roles through an understanding of the instructional applications and realize the potential of technology to enhance the teaching and learning process (International Society of Technology in Education, 2002).

Current Studies and Theories of Technology Leadership

This section examines recent studies and reviews on leadership's role in technology integration. Although scholarly literature about technology leadership is relatively sparse, the studies and reviews cited in this section focus on leadership's role in influencing technology integration and also how technology influences the work of leadership in its day-to-day practice. These studies and reviews are divided into three themes: (1) the need for technology leadership, (2) technology leadership and school reform, and (3) technology leadership for the future.

The Need for Technology Leadership

R. E. Anderson and Dexter (2005) conducted a study that provided empirical data on technology leadership. For their study, they defined *technology leadership* as a variable that measures school technology leadership. It represents the organizational decisions, policies, or actions that facilitate effective utilization of information technology throughout the school. In their study, the technology leadership variable is the sum of eight other indicators: budget, district support, grants, intellectual property policy, principal days, principal e-mail, staff development policy, and technology committee.

Technology leadership as an independent variable was measured against three dependent variables; use, (such as emails, attendance, gradebook, etc), teacher integration in lessons, and student use. Findings indicated that technology leadership showed significant positive correlation and was the strongest indicator of the three dependent variables. The only other variable, ratio of students to computers, was significant to the three dependent variables. Thus, technology leadership was shown to be more important than the technical infrastructure or expenditures.

In their study of the role of the administrator in instructional technology policy, P. Daniel and Nance (2002) found that administrators serve a critical function in the effective

implementation of technology. Their findings indicate that although the federal government and most states recognize the fact that schools must prepare students for a world driven by technology, they have failed to provide a clear role of how building leaders are to make this happen. Although the study deals mainly with involving administrators in the political arena, the authors argued that the role of the leader of technology is not yet clearly defined. Involving leaders in the development of technology policy for which they are ultimately responsible will allow for effective integration to occur.

Piper and Hardesty (2005) suggested that leadership is needed as an influence on teachers' use of technology. In their study of 160 teachers in Pennsylvania, they measured teacher attitudes toward using computers and their perception of the role of the school leader in technology implementation. The study's findings indicate that leaders who exhibited different leadership styles were effective at encouraging teachers to use computers. However, other behaviors such as inspiring, motivating, and providing assistance proved to be more effective when encouraging teachers to incorporate technology in their classrooms.

These studies involving the need for technology leadership echo the NETS-A standards. Brooks-Young (2002) stated, "School administrators that have not yet assumed the role of technology leader need to do so now" (p.179). The studies advocated the need for administrators to work collaboratively as they motivate and encourage their staff (Standard 1-Leadership and Vision), and provide resources (Standard 4-Support, Management and Operations) to create sustained commitment to fully integrated technology programs (Standard 2-Learning and Teaching) (Brooks-Young, 2002).

Technology Leadership and School Reform

Clouse and Nelson (2002) in their review on school reform suggested two important aspects involving reform that must be resolved: the distributive aspect and the constitutive aspect of educational change. Distributive change involves small-scale changes that usually leave the organization stable. Constitutive changes on the other hand involve changes that are radical, often producing instability in the organization. They defined the changes brought on by technology as constitutive. To successfully bring reform and technology innovation to their schools, leaders must find ways to merge traditional schooling with constructivist teaching and learning concepts inherent in technical implementation.

Leadership specific to technology was investigated by L. Thomas and Knezek (1991), as they surveyed experts in education and instructional technology to "explore the role technology is expected to play in restructured schools and to indicate the level of competence in technology-related skills needed by educational leaders" (p. 265). They concluded that technology will play a major role in restructuring schools, and that school leaders will require more resources, efficient information related to instruction, ways to secure alternative funding, and professional development to better respond to reforms focusing on technology.

Dawson and Rakes (2003) conducted a study similar to R. E. Anderson and Dexter's (2000) study on the how the administrator deals with issues of change leadership, instructional leadership, and technology leadership. They explored the relationships between the amounts and types of technology training received by the K-12 principals and the levels of technology integration into the schools' curricula. The study also collected data on demographics. Using the Web as a surveying vehicle, they selected 1,104 public and private (k-12) school principals from the Web66 International School Registry and placed the URL on listserv for the National

Association of School Principals. Results indicate that 68% of the principals were receiving significant amounts of technical training. One third of the principals in this study had not received any training to prepare them to integrate technology in their schools. Demographic findings indicate that the age of the administrator was significant; however, neither the sex of the administrator or the number of years a principal served as an administrator was significant.

The question of most interest was the amount of training received by the administrator in the past 12 months. Findings indicate that "principals receiving as little as 13-25 hours of technology training in a year began to comprehend technology's worth" (p. 44). In summary, the findings indicate that as the number of technology training hours received by the principal increased, the measures of technology implementation in the school increased accordingly.

Tong and Trinidad (2005) conducted an in-depth qualitative case study of an innovative primary school in Hong Kong. The study investigated the likely factors needed to produce pedagogically sound environments to facilitate effective and innovative curriculum change. The relationships between four factors were explored; professional attributes of teachers, school integration of technology capacity, school system capacity, and school leadership. The question of most concern was how these factors influenced the teacher's perception and willingness to use computer instruction in their classrooms.

The study addressed this question of concern by first introducing what a technology innovative classroom might look like, then identifying the possible impacts of various conditions and constraints on development of such innovations. Findings indicate that school leaders can formulate optimum strategies for technical implementation and develop a deeper awareness of the potential influences of those factors. Using the whole school model approach and a principal

with a vision for technology implementation, it is possible to successfully integrate innovations into the curriculum and sustain their development.

Technology Leadership and the Future

Brockmeir et al. (2005) investigated the relationship of K-12 principals with computer technology. Two-hundred and sixty-eight principals selected from the Florida's Education Directory 2001-2002 responded to the technology survey about their role in (a) "facilitating and participating in the integration of computer technology, (b) perceptions about computer technology for managerial and administrative tasks, (c) expertise acquired to use computer technology, and (d) professional development needs to enhance computer technology skills" (p. 45). Findings indicate that 66% of the principals reported that they agree or strongly agree that they spend a significant amount of time assisting teachers in implementing technology. Also, 76% said that they agree or strongly agree that their role as a technology leader requires them to facilitate technology into the curriculum and the teaching and learning process.

However, only 82% reported that they agree or strongly agree to provide professional development release time for technology training, and only 55% said they agree or strongly agree to release time to evaluate software appropriateness for integration into the classroom. Brockmeir et al. (2002) concluded that although principals do seem to recognize the powerful impact technology can have on the classroom, their expertise necessary to facilitate technology into the teaching and learning process is lacking. Those surveyed identified visionary leadership, making appropriate policies and plans for technology, understanding teachers' individual technology progress, and participatory decision making significant for promoting technology use.

Lastly, the next group of authors discussed the type of leadership styles that future leaders may embrace as they continue to define a leadership style most suited for technology implementation. Downes (2005) suggested the theory of distributed representation leadership. He suggested that distributed representation is the idea of teaching not by telling or demonstrating, but where learning is created in an environment in which the learner is immersed. Downes further argued that distributed leadership is enabled uniquely through learning how to use computers and produces a network that has enumerable pedagogical outcomes.

Crowther (2002) suggested that principal leadership as perceived by today's administrators is outdated, and proposed a model of parallel leadership. He defined parallel leadership as a process of teacher leaders and their principals engaging in collective action to build capacity. Parallel leadership shares the responsibilities and embodies mutual respect for individual contribution.

Gurr (2004) described three current views of what he called e-leadership. He suggested a new direction for technology leadership with his concept of e-leadership. E-leadership, although not directly connected with education, may provide insight into how the concept will develop. The first view treats e-leadership as continuous with existing views of leadership but with a new label most noticeably related to organizational image. The second acknowledges that what is already known about good leadership continues to apply. However, there are additional paradoxes and dilemmas associated with the application of integrated computer technology (ICT) that may lead to a more dispersed view of "hyperlinked," rather than "hierarchical," leadership. Finally Gurr (2004) suggested that ICT-mediated environments affect leadership behavior and that assumptions about leadership may be changing as a result. The implications for educational leadership may include parallel changes in leadership behavior. These changes call

for leaders to exhibit interpersonal skills in different technology-integrated environments, and also for dispersed leadership responsibilities.

Summary

Effective leaders do not pick one of the previously mentioned styles or strategies and staunchly adhere to its precepts, but on any given day they use one or more of the strategies described. Can leaders alter their style to become an effective change facilitator? Hall et al. (1984) maintained that "one's style is closely tied to personality and history that is not easily changed…. The role of the principal in the school reform process must be viewed in terms of the many factors that affect it" (p. 27).

Finally, school administrators should become proficient not only in traditional methods of leadership, but should also prepare themselves for specific types of leadership geared toward technical leadership. According to Valdez (2004), that type of leadership for technology includes a combination of many leadership qualities and the ability to handle change implementation, resources, professional development, emerging techniques, equipment, and software.

As of yet there is no consensus on the effectiveness of NETS-A standards; however, many states have adopted or adapted these standards as guidelines for principals to follow when striving for proficiency in technology implementation. This study provides a snapshot of the school leader's proficiency in the NETS-A and the relationships of school climate toward effective technology implementation.

School Climate

Hoy and Miskel (2008) defined "school climate as a relatively enduring quality of the school environment that is experienced by participants, affects their behavior, and is based on their collective perceptions of behavior in schools" (p. 198). The terms *culture* and *climate* are

37

often mingled together when discussing the work environment, however they are different. They differ in their intellectual origins. Culture, the more abstract, draws from anthropology and sociology and uses ethnographic and linguistic techniques to capture the nuances of organizational assumptions and ideology. Climate, the more concrete, uses statistical analyses to describe behavior and arises from psychology and social psychology. The two views are complementary, but distinct (Hoy, Tarter, & Kottkamp, 1991).

School culture emphasizes the importance of concepts such as norms and values, as well as both formal and informal interactions within the organization (Hoy, 1990). School culture also focuses on the characteristics of organizational life, revealing teachers' assumptions about learning and teaching (Hoy et al., 1991). In contrast, school climate is based on the perceptions of the individual teachers within the organization and is more typically observable and more easily identifiable (Hoy et al., 1991). The school's climate is grounded in the routine organizational practices that are deemed important to the organization and its members. Borrowing from Halpin and Croft (1963), Hoy (1990) made this analogy: "Climate is to organization as personality is to individual" (p. 151).

Hoy et al. (1991) argued that, "even with the difficulty in defining school climate, the concept of school climate is important in its own right because of the extent to which the school atmosphere promotes openness, colleagueship, professionalism, trust, loyalty, commitment, pride, academic excellence, and cooperation, and is critical in developing a healthy work environment for teachers and administrators" (p. 2). The educational climate in which technology innovation takes place is significant for successful integration. For this review the focus will be on the school's organizational climate, the perceptions of the school, and how school leaders' understanding of the climate can lead to more effective technology integration.

Brief History of School Climate

Research of climate in the workplace originated in the 1950s in three areas: business, university contexts, and later work in classroom climates (C. S. Anderson, 1982). In the business arena, Tagiuri and Litwin (1968) identified climate as the total environmental quality within a given building and suggested that the environment included four areas: the ecology (physical and material aspects); milieu (social presence of persons and groups); social system (relationships of persons and groups); and culture (belief systems, values, cognitive structures and meanings).

Early instrument development to assess climate in the college context emerged with the first systematic measuring instrument for college students developed by Pace and Stern in 1958. The College Characteristics Index (CCI) measured the environmental pressures that student perceive to be exerted by a given school.

In the late 1960s, researchers began to study classroom climates, leading to the development of major school climate measuring instruments. Halpin and Croft (1967), developed the concept of school climate. Halpin had previously developed a concept and measure of leader behavior (LBDQ) that predicted the effectiveness of leaders based on the behaviors of consideration and initiating structure. Leaders who were above average in these techniques, argued Halpin, would be more effective. However, sometimes these leaders failed. Halpin began to investigate the social context of schools in which above-average leaders were not successful. What he found was that the teacher group, if it were not ready to accept the leader would "immobilize him" (p. 132).

Halpin and his colleague Croft (1967) also developed the Organizational Climate Description Questionnaire (OCDQ), and the measure was widely used for many years. The

OCDQ was originally scaled on elementary schools, which limited its use for secondary schools, and had some other psychometric problems (Hoy & Miskel, 1996).

In the 1980s, Hoy and his colleagues at Rutgers University began a series of revisions of the climate measure. One theme of revision drew heavily on Paronsonian social theory and yielded a measure of organizational health, the OHI (Hoy & Sabo, 1998). The measure took a broad look across the organization from teacher, administrative, and institutional behaviors and looked at both instrumental and expressive outcomes. At the teacher level, for example, morale as teacher behavior was an expressive outcome that contributed to the cohesion of the organization. Academic emphasis, another behavior at the teacher level, captured the instrumental or goal-attaining activities of the school (Hoy & Sabo, 1998).

A second series of revisions (Hoy & Sabo, 1998) used a metaphor of personality for a school, that is, schools could be open or closed. Drawing on that description of a school, a measure, the Organizational Climate Description Questionnaire-Revised, was developed and validated that tapped the social dynamics between teachers and between teachers and administration. Although the concepts of the revised measure were different from Halpin and Croft's original, the name Organizational Climate Description Questionnaire was retained to honor the inventors of the concept.

In an effort to find a more parsimonious measure of the concepts of health and climate, the subtests of the OHI and the OCDQ were analyzed to identify factors that might reduce the number of subtests. The research was successful (Hoy & Sabo, 1998), and the Organizational Climate Index (OCI) emerged as a useful research tool. When Hoy and Sabo (1998) carried out a second-order factor analysis of both the OHI and the OCDQ, a four-concept measure was created. The concepts are as follows:

Collegial Leadership is directed toward both meeting the social needs of the faculty and achieving the goals of the school. The principal treats teachers as professional colleagues, is open, egalitarian, and friendly, but at the same time sets clear teacher expectations and standards of performance.

Professional Teacher Behavior is marked by respect for colleague competence, commitment to students, autonomous judgment, and mutual cooperation and support.

Achievement Press describes a school that sets high but achievable academic standards and goals. Students persist, strive to achieve, and are respected by each other and teachers for their academic success. Parents, teachers, and the principal exert pressure for high standards and school improvement.

Institutional Vulnerability is the extent to which the school is susceptible to a few vocal parents and citizen groups. High vulnerability suggests that both teachers and principals are unprotected and put on the defensive

The importance of assessing climate in this study goes back to the original problem faced by Halpin in applying leader behavior to schools, that is, sometimes the social context of the school will frustrate the work of the leader. To test the effect of NETS-A leadership in the implementation of technology, it is necessary to know the kind of climate in which the leader works.

<center>Technology Leadership and School Climate</center>

According to Hodas (1993), technology is never neutral: its values and practices must always either support or subvert those of the organization into which it is placed. He contended that technology would impact the look-and-feel of school. If the leader, when implementing

<center>41</center>

technology, fails to take into account the existing climate and culture, technology integration may then be viewed as an outside disruption, and full integration will not be successful.

Leadership behaviors that lead administrators to form positive school climates and learning environments have often been the subject of investigation. According to Bulach, Boothe, and Pickett (2006), behaviors of building-level principals are linked to school climate. Findings from their study revealed that teachers' views of teacher-principal interactions are related to school climate. Bulach et al. surveyed 375 teachers from four Louisiana schools. The survey consisted of 49 positive and negative behaviors of principals in the following domains: human relations, trust/decision making, instructional leadership, control, and conflict. A +.95 correlation was found between scores on the leadership behavior survey and scores on a culture and climate survey. The authors concluded that the strong relationship between the way principals interact with teachers and the overall climate and culture of the school are early indicators of the principal's leadership effectiveness.

Interest in the study of school climate is also linked to organizational research and studies in school effectiveness (C. S. Anderson, 1982; Brookover, 1978; Edmonds, 1979; Purkey & Smith, 1983). Research on school climate has led some researchers to the belief that what makes a school effective may be attributed more to school and teacher effectiveness than to socioeconomic status and home background of students.

Principals concerned with improving student achievement are encouraged to concern themselves with the school climate. Brookover (1978) in his analysis of effective schools versus ineffective schools (as defined by the academic achievement of those students from low socioeconomic backgrounds) stated, "The differences in school climate explain much of the

42

differences in academic achievement between schools that are normally attributed to composition of social economics" (p. 303).

Hoy et al. (1991) suggested that principals' behaviors such as effective communication, teacher advocacy, and participator decision-making lead to healthy climates. Kozlowski and Doherty (1989) suggested that leadership and organizational climate are intertwined and a positive school climate can yield positive educational outcomes for students and school personnel. C. S. Anderson (1982) suggested that the role of the administrator is critical in improving and maintaining a positive school climate.

The leadership role of individual schools plays an important role in shaping the climate. Yuen, Law, and Wong (2003) in their study of 18 schools in Hong Kong over a 5-year period as they were integrating technology found that leaders who were controlling, monitoring, and overly concerned with the management experienced less success with technology integration. However, leaders that supported and empowered their teachers and students to initiate new ideas as they integrated technology experienced the greatest success.

The study also indicated that schools are different in their response to technology implementation. The challenge for leaders when implementing technology is to have a clear direction and a school culture empowered to handle the magnitude of change. According to Davidson and Olsen (2003), the change posed by the integration of technology affects the social practices of the school and may present challenges for leaders. The two changes, technological and social, are interrelated. Effective leadership for the change technology integration poses is most likely achieved when the principal seeks to promote a positive school climate that enhances the teaching and learning process.

Technology Integration and Pedagogic Leadership

Since 1994, the National Center of Education Statistics [NCES] has surveyed public schools to measure what proportions of them are connected to the Internet. By the fall of 2000, almost all public schools in the United States had access to the Internet: 98% were connected (National Center of Education Statistics, 2006).

Also, in the fall of 2000, the ratio of students to instructional computers in public schools was five to one, the ratio that many experts consider "a reasonable level for the effective use of computers within the schools" (President's Committee of Advisors on Science and Technology 1997, p. 14). However there is growing research that shows that a large percentage of U.S. public schools have not "effectively" integrated technology (Cuban, 2001; Oppenheimer, 2003).

Dufour (2002) emphasized a leadership shifting away from being the "instructional leader" to being the "learning leader." Additionally, this shift involves a school leader willing to lead in reforming the school culture and reflect new ways of teaching and learning (Sheingold & Tucker, 1990). These reforms are directly related to a change in teacher pedagogy, and this is where the principal plays a lead role.

MacNeill, Cavanagh, and Silcox (2005) suggested that principals should be pedagogy leaders, concerning themselves with learning that encourages student intellectual growth and less concerned with viewing students as the "object of curriculum implementation" (p. 1). Leaders desiring effective technology integration should demonstrate credible knowledge of the teaching and learning process. David (1994) suggested that educators who want to realize the visions for technology should ask the right question: "how to use technology to change practice to reach

new goals—as a catalyst for change and as a tool in creating, implementing, managing, and

communicating a new conception of teaching and learning and a system that supports it" (p. 1).

Leaders must be knowledgeable of how teachers view technology integration in their

daily lessons. Pierson (2001) investigated how teachers used technology and how their

technology use related to their general teaching practice. She found that teachers integrated

technology in their lessons based on their own individual teaching strategies. Describing a

teacher who effectively integrates technology is one that draws on extensive content knowledge

and pedagogical knowledge, in combination with technological knowledge. She illustrated this

concept in Figure 1.
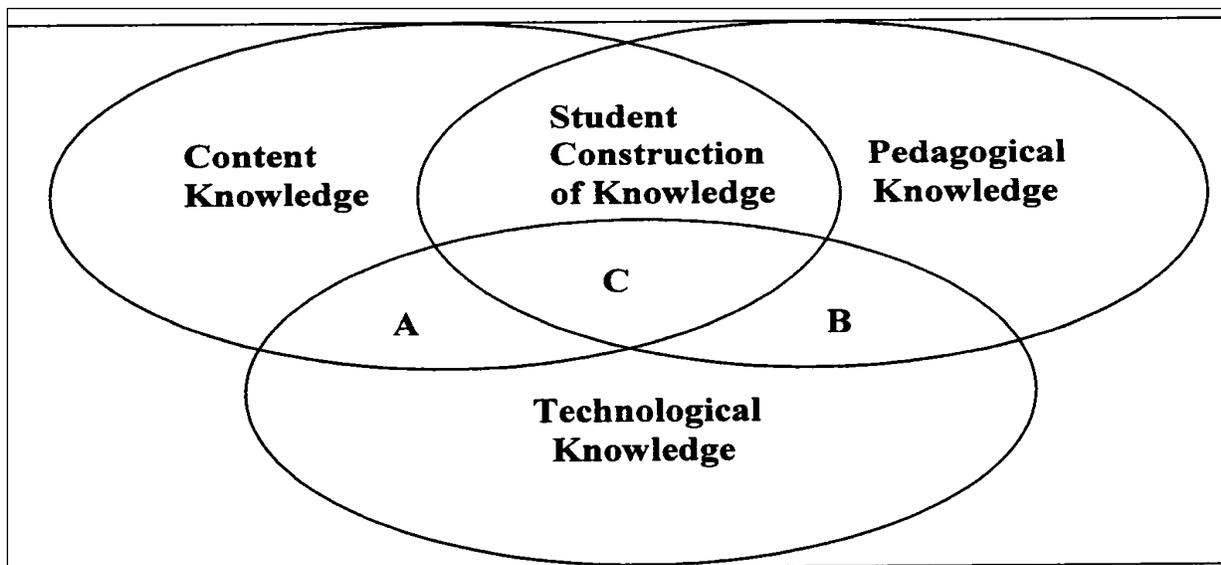
Figure 1. Pierson's model of technology integration illustrates the relationship among content, pedagogical, and technological knowledge. Section C represents technological-content knowledge.

Teachers should make the focus of integration on the pedagogy of effective practices for

teaching and learning. According to Okojie, Olinzock, and Okojie-Bolder (2005), the task of

integrating technology into the teaching and learning process has contributed to the limited use

of technology by many teachers. They further stated, "Technology used for teaching and learning

should be considered an integral part of instruction and not as an object exclusive to itself"
(p. 66). To use technology effectively, teachers must understand how its use fits into the larger
curricular and instructional framework.

<center>Technology Integration and Constructivist Pedagogy</center>

With access to more computers and the widespread availability of the Internet, the
question prevails, why is technology not being fully integrated and widely used in today's
classrooms? In order to fully understand the importance of the principal's role as the technology
leader and the influence of the school climate toward integration, this section of the review
sought literature describing technology integration as an effective tool for teaching and learning.
The technology leader's role has been brought to the forefront not by technology alone, but by
the movement from the traditional tasks of setting goals and daily management to a more in-
depth involvement in the core of teaching and learning (Baylor & Ritchie, 2002; Flanagan &
Jacobsen, 2003; Jacobsen, 2000).

There are a few pockets of creative teachers using technology effectively (Cuban, 2001);
however most teachers do not have the expertise in integrating technology into the teaching
learning process for the purpose of enhancing student learning. In 2003, the National Assessment
of Educational Progress (NAEP) reported with regard to math teachers of fourth graders that the
overwhelming majority used computers for drill and practice or math games. Very few were
using computers for higher order thinking tasks (Park & Staresina, 2004).

Heflich (1996), in his investigation of the impact of online technology on teaching and
learning, concluded that use of technology as computer mediated communication encourages
teachers to become more committed to individualized instruction and small group work. He

<center>46</center>

further found that those teachers using online technology used the constructivist model of self-directed learning.

Individualized instruction and small group work are both elements of an educational movement called constructivism. Constructivism is a theory about how individuals learn. The basic proposition of constructivism is that learning means constructing, creating, inventing, and developing one's own knowledge (Marlowe & Page, 2005). Historically, constructivism can be traced back to Jean-Jacques Rousseau, in his classical work, *Emile* (1762), a treatise on what education should be. Rousseau believed that the classical education of his time, which consisted of reading and memorizing, prevented students from active learning. He proclaimed that the classical education was boring and beyond the child's comprehension and that it taught students "to believe much and know little" (p. 90). He argued that students learn through the senses, experience, and activity (Rousseau, 1762).

Comparable to Rousseau's work in France is the work of John Dewey in the United States during the first half of the 20th century. Dewey (1990) rejected traditional education because it did not involve problem solving or reflective thinking. Dewey argued that the child's interest should be of utmost importance in their education. He put the learning of the child at the forefront of education, as he stated, "It is his (the child's) present powers which are to assert themselves; his present capacities which are to be exercised; his present attitudes which are to be realized" (p. 209).

During the mid-20th century, further laying the foundation of constructivism, is the work of Jean Piaget and Jerome Bruner. Piaget (1990) believed that students construct their own knowledge schemes in relation to, and filtered through, previous and current experiences. Likewise, Bruner (1990) believed that the child learns through discovery. What a person

discovers for himself is what he truly knows. The goal of the learner is to be autonomous and self-propelled thinkers.

Although, the mentioned theorists did not use the word *constructivism*, they all subscribed to the core concepts of learning revolving around the learner. During the1980s and 1990s constructivist-based active learning movements enjoyed a renewal of concepts posed by the important thinkers of the past. Some of the movements included are the following: the elementary school, Whole Language Movement middle school reforms, and high school restructuring. (National Association of Secondary School Principals, 1996).

Ertmer (2005) claimed that one of the barriers teachers must overcome when integrating technology is their own pedagogical beliefs. She stated, "It is imperative that leaders increase their understanding of the ability to address teacher beliefs, as part of their efforts to increase teachers' technology skills and uses" (p. 40). Present day constructivists Jonassen, Campbell, and Davidson (1994) argued that technology should not be used in the traditional sense, as a delivery vehicle or controller of instruction, but as a tool to facilitate thinking and knowledge construction.

To use technology effectively, teachers must understand how its use fits into the larger curricular and instructional framework. Jonassen (1996) developed guiding principles to help teachers implement constructivist activities in their classroom:

- Active—Learners are engaged by the learning process in mindful processing of information, where they are responsible for the results.

- Constructive—Learners accommodate new ideas into prior knowledge (equilibrating) in order to make sense or make meaning or reconcile a discrepancy, curiosity, or puzzlement.

- Collaborative—Learners work in learning and knowledge building communities, exploiting each other's skills while providing social support and modeling and observing the contributions of each member.

- Intentional—Learners are actively and willfully trying to achieve a cognitive objective (Scardamalia & Bereiter, 1996).

- Conversational—Learning is inherently a social dialogical process (Duffy & Cunningham, 1996) in which learners benefit most from being part of knowledge building communities both in class and outside school.

- Contextualized—Learning tasks are situated in some meaningful real-world task, or simulated through some case-based or problem-based learning environment.

- Reflective—Learners articulate what they have learned and reflect on the process and decisions that were entailed by the process.

Each principle is mirrored in the National Educational Technology standards for Students (NETS-S) (International Society for Technology in Education, 2002). Also, each principle provides the higher order thinking and problem-solving skills recommended by the President's Committee of Advisors on Science and Technology (1997).

Marlowe and Page (2005) argued that "if teachers use technology to do the same thing they were doing in a traditional format, one would have to ask: Why bother?" (p. 104). Technology used to help develop or complement the constructivist ideas and approaches can be of value. The following are questions to ask in determining if constructivist goals are being met: (1) Are students discovering for themselves?, (2) Are they developing problems and questions, investigating and searching for data, and finding resolutions?, (3) Are they interpreting and synthesizing materials that thinkers who do not depend on the opinions of others?, and (4) Are

students developing new knowledge or simply shuffling information around (Marlowe & Page, 2005)?

In an investigation by Niederhauser and Lindstrom (2006), teachers described technology-based activities they conducted with their students. In over 716 cases this study addressed the NETS-S for students through constructivist technology in K-12 classrooms. The data indicated that teachers' instructional technology has shifted away from the drill and practice pervasive in the 1980s and 1990s, toward more constructive hands-on, tool-based uses. However, the pedagogical shift toward a constructivist view of teaching and learning is incomplete as teachers need further implementation of the higher order thinking skills.

Clouse and Nelson (2000) suggested that placing technology at the point of instruction greatly enhances its effectiveness. For schools to truly incorporate technology there must be a fundamental change in the process of schooling. The authors warned that this approach challenges the core values of public education. They argued that in order for technology to be fully integrated, major changes in the structure of the school would have to be initiated. The leader's willingness to begin this change will allow students to take full advantage of the potential of technology.

<div align="center">Theoretical Framework</div>

Current leadership theory suggests that the behavior of the leader must accommodate the context of the organization (Yukl, 2006). The closer the accommodating, the more effective the organization's outcomes. Technological leadership as conceptualized and measured by the NETS-A, working with a healthy and open climate, should bring about effective technological implementation.

Suggestions for what school leaders should know and be able to do with technology have expanded over the last 10 years. Knezek (2002) suggested that the most effective technology leadership may be leadership that mirrors leadership for change. NETS-A guidelines, serving as an operational definition of technology leadership, are a logical extension of the change leadership espoused by Fullan (2002), Senge (1990), Yukl (2006), and others who have argued for improved leadership.

In promoting NETS-A, ISTE (2002) suggested that the standards are indicators of effective leadership for technology. However, this was not a claim based on data, which is understandable given the limited number of studies that test the technology-related activities of school leaders against the attainment of technology outcomes. The literature reviewed indicated that technological innovations do not succeed without sustained leadership at the building level. Although the NETS-A standards may represent the common wisdom known about technology leadership, the research findings suggest that principals, although lagging behind in their technology skills, tend to recognize their need to be involved and engage others with technology use in classrooms.

The construct of school climate was shown to have corresponding factors to leadership in its importance to technology integration. Both constructs require openness, flexibility, cooperation, and continuous learning. Both are concerned with enhancing teaching and learning, problem solving, and collaboration. Schools whose climates are more conducive to accepting and implementing technology are those that share an open healthy environment. Attitudes held by teachers as they are reflected in the organizational culture affect teacher commitment to technology integration (Crowther, 2002). Leaders should have an understanding of the factors

that support or inhibit the use of technology and how best to structure change to promote integration of technology (Adamy & Heinecke, 2005).

The construct of technology integration is defined as the incorporation of technology and technology-based practices into the daily routines, work, and management of an organization (National Center for Educational Statistics, 2006). Furthermore, teacher technology integration is defined as the teachers' technology skills, use, and pedagogies used daily in the classroom. The literature reviewed in the area of integration strongly suggests that technology integration must be placed at the point of instruction. Teachers should make the focus of integration on the pedagogy of effective practices for teaching and learning (Pierson, 2001).

Based on the review of literature, it is this researcher's belief that leadership behaviors closely aligned with standards suggested by NETS-A will enhance teacher collaboration and stakeholders' involvement and have a positive correlation with technology integration. Also, it is this researcher's belief that school climates supporting healthy environments being open to teacher innovations will have a positive correlation with technology integration. Together, the constructs of leadership behavior and an open school climate will positively correlate to technology integration.

Campus-level leaders' efforts to facilitate technology and their overall school climate influence toward implementation appear to make a difference. What is not yet known is the role and relative importance of leadership behaviors and the type of climate that will affect implementation. To address how the two constructs of technical leadership behaviors as accessed and measured by NETS-A and school climate work together in promoting integration, the following research questions are posed followed by the hypotheses.

Research Questions

RQ1. Will campus-level technology leadership and school climate form a composite positively related to teachers' technology integration?

RQ2. Will campus-level leadership and school climate positively correlate with teachers' technology integration?

RQ3. Will campus-level leadership and school climate contribute to teachers' technology integration skills, use, and constructivist pedagogies?

Hypotheses

H1: The more technological leadership from administrators, the higher the level of teachers' use of technology.

H2: The more technological leadership from administrators, the better the school climate.

H3: The more technological leadership from administrators and the better the school climate, the higher the level of teachers' use of technology.

Summary

The literature review offers a brief history of educational leadership and the current state of leadership behaviors and strategies that mostly likely will lead to effective technology integration. The discussion operationalized technology leadership in terms of NETS-A (a suggested leadership guide) as a conceptual definition of leadership that connects broadly to the organizational context. Also, the study reviewed how technological leadership works with a healthy and open school climate to predicate technological implementation.

The literature reviewed systematic changes occurring in the schools brought to the forefront by technology use and how technology has transformed education and the business world as well as our everyday lives. A brief overview of current leadership strategies were discussed and finally technology leadership as defined in terms of the NETS-A is linked to leadership. The literature revealed that campus-level leaders play an instrumental role in the effective use of technology in the school.

The research provided a broad look at leadership behaviors and strategies available for leaders desiring to implement effective technology in their schools. A discussion on the guidelines of NETS-A and the needed skills for campus-level leaders to effectively integrate technology was offered.

Also, the literature review focused on the role of school climate in the process of integrating technology into the teaching and learning process. Research on the importance of assessing the attitudes and the beliefs of the schools environment and ways of measuring the school climate were addressed in this section.

The last main section included literature pertaining to the leader's pedagogical leadership role in helping teachers integrate technology in their classroom. Also, a discussion on the research surrounding the need for leaders and teachers to approach technology integration in terms of constructivism pedagogies was investigated.

CHAPTER 3

METHODOLOGY

Introduction

This nation is spending millions of dollars to advance technology in the classroom under

the direction of leadership that is lacking in training, expertise, and technology skills, all of

which could be considered a huge waste. Leaders who want to effectively implement technology

in the teaching and learning process must acquire skills to articulate the vision, model technology

use, and empower teachers to embrace technology in their classrooms.

This chapter describes the methodology used to guide the research. Three surveys were

utilized to determine whether a relationship exists and, if so, to what extent it exists between

campus-level leaders' perceived adherence to NETS-A and the school climate to predict

effective teachers' integration of technology.

Design of Study

This study is a quantitative investigation to identify the extent to which teachers'

integration of technology in their classrooms correlates to the campus-level leaders' adherence to

the National Educational Technology Standards for Administrators (NETS-A) and the overall

school climate.

Research Population

Survey and assessment data were collected from 32 schools in Clayton County Public

School in Clayton County, Georgia. The sample consisted of 4 high schools, 7 middle schools,

and 21 elementary schools. The Clayton County Public School System is the 113th largest

school district in the United States and the fifth largest in Georgia. Twelve miles south of Atlanta, Clayton County covers 142 square miles and is home to over 270,000 residents. There are 59 Clayton County Public Schools: 35 elementary, 14 middle, 8 secondary, 1 alternative, and 1 evening, with a total student enrollment of 50,800. All schools are classified as urban.

Total population for high schools comprises 14,200 students; middle schools consist of 12,100 students, and elementary schools consists of 24, 500 students. The 32 participating schools have 2,200 teachers and were given either the TAGLIT or the OCI surveys for teachers. Kerlinger formula for randomization was used to randomize all teacher surveys. In addition, 44 campus-level leaders (principals and assistant principals) of these same 32 schools responded to the NETS-A survey. Permission was granted by Clayton County Public Schools to conduct research (see Appendix A).

<center>Instrumentation</center>

For this research study, three measurement instruments were used: the National Education Technology Standards for Administrators (NETS-A) survey (see Appendix B), Taking A Good Look at Instructional Technology (TAGLIT) survey (see Appendix C), and the Organizational Climate Index (OCI) survey (see Appendix D).

The NETS-A survey collected information from campus-level leaders (principals and assistant principals) about K-12 technology leadership. Also, data were collected using the OCI survey measuring school climate from the teachers of the same K-12 schools. Then the data from the NETS-A and the OCI were correlated with TAGLIT (Cory, 2001) survey data about technology integration, and again collected from teachers at the corresponding K-12 schools. Teacher surveys were randomized using Kerlinger's formula of randomization. This

correlational study used multiple regression analysis to identify the extent to which technology leadership and school climate influence technology integration pedagogies.

National Education Technology Standards for Administrators (NETS-A) Description

Acknowledging leadership as a key factor in successful implementation of technology, this investigation gained information about principals' perceived adherence to the NETS-A and the level of technology implementation in their schools. Six categories were examined that were based on NETS-A (see Appendix B) and that presented information about the principals' technology expertise in the following areas: (1) leadership and vision; (2) learning and teaching; (3) productivity and professional practice; (4) support management and operations; (5) assessment and evaluation; and (6) social, legal, and ethical issues. Also, the level of technology integration examined principal demographics such as age, sex, years of experience, school size, and wealth of district.

NETS-A Survey Content Validity and Reliability

The goal in the development of NETS-A was to produce a short, multiple-choice assessment to measure the school technology leadership of an individual school administrator. NETS-A is designed to align with the existing National Education Technology Standards for school administrators. The American Institutes for Research (AIR) and the UCEA Center for the Advanced Study of Technology Leadership in Education (CASTEL) used the following process to develop, test, and validate the assessment instrument.

The team referenced Susan Brooks-Young's (2002) *Making Technology Standards Work for You* and other literature on school technology leadership to gather additional information on standards. They also collected existing surveys and assessments and solicited the advice of

researchers to identify best practices in leadership assessment, self-assessment, and item development.

The development team drafted items by individually reviewing each item to assess general face validity and alignment with the six dimensions of NETS-A. Checking for alignment with the standards required reviewers to assign each of the proposed items to one of the six NETS-A dimensions (e.g., Leadership and Vision, Learning and Teaching, etc.). If the reviewers assigned an item to different categories, the item was revised and the reviewers agreed that it aligned with the same specific NETS-A dimension. This process led to a draft instrument of approximately 35 items with four to six items per NETS-A dimension.

The draft instrument was reviewed by 10 content experts in the field of education technology and school leadership. Each reviewer completed a scoring sheet, which included two 5-point scales for each item. The expert review provided additional evidence of the assessment's face validity and helped confirm that both the standards and the assessment were aligned. The development team revised all but 7 of the 33 items in the draft, eliminating two and adding four items. CASTEL piloted the test and collected data from 74 school principals in August 2005.

Overall analysis indicates that reliability of the test as a whole is high: Cronbach's alph $(\alpha) = 0.95$. The item-test correlations show the correlation between each item and the overall instrument; the range of item-test correlations is $r = 0.39$ to 0.80, with only 7 items correlated at less than 0.50. The instrument evidences high reliability, which is not to be further enhanced or decreased by the removal of individual items. In the overall analysis, no items appear to function poorly or warrant removal. The instrument appears to appropriately measure the desired construct of technology leadership.

Taking A Good Look at Instructional Technology (TAGLIT) Survey

Teachers responded to the Taking a Good Look at Technology (TAGLIT) survey (Appendix C). TAGLIT is an array of assessment tools designed to help school leaders gather, analyze, and report information on how technology is used for teaching and learning in their schools. Using three areas from the TAGLIT survey, teachers responded to (1) basic tools (word processor, spreadsheet, and database); (2) multimedia tools (drawing/painting software, digital camera/scanner, presentation software, and multimedia software); and (3) research and problem-solving tools (CD-ROMS, search engines, graphic organizers). This researcher defined teachers' technology skill areas by computing an average score on a scale of 1 (I don't know how to do this) to 4 (I can teach others to do this) in each of the three areas.

TAGLIT Survey Content Validity and Reliability

The TAGLIT survey was originally developed at the Principals' Executive Program in North Carolina for use by principals participating in a 30-person technology leadership program. It was designed to give principals a current status report of technology for teaching and learning at their school. It is currently being used by schools nationally (over a million users thus far) as part of the work being done on technology leadership by the Bill and Melinda Gates Foundation. TAGLIT has no formal reliability/validity assessment.

Organizational Climate Index (OCI)

The Organizational Climate Index (OCI) developed by Hoy, Smith, and Sweetland (2002) was used to measure the climate of the school. The OCI has four dimensions: principal leadership, teacher professionalism, achievement press, and vulnerability to the community. The measure is a combination of the Organizational Health Index (OHI) and the Organizational

Climate Description Questionnaire (OCDQ). The OCI is a revision of the earlier School Climate

Index (SCI).

OCI Content Validity and Reliability

Each of the four dimensions showed high reliability scores when measured by a subtest

of the OCI: collegial principal behavior (.94), professional teacher behavior (.88), achievement

press (.92), and institutional vulnerability (.87). The scales responses are from 1 (*Rarely Occurs*)

to 4 (*Very Frequently Occurs*). Each item was scored for each respondent, and then an average

school score for each item was computed by averaging the item responses across the school.

Thus an average school score was computed for Item 1, and then Item 2, and so on. The four

subtest scores represent the climate profile of the school. Figure 2 shows the relationship of the

three surveys.
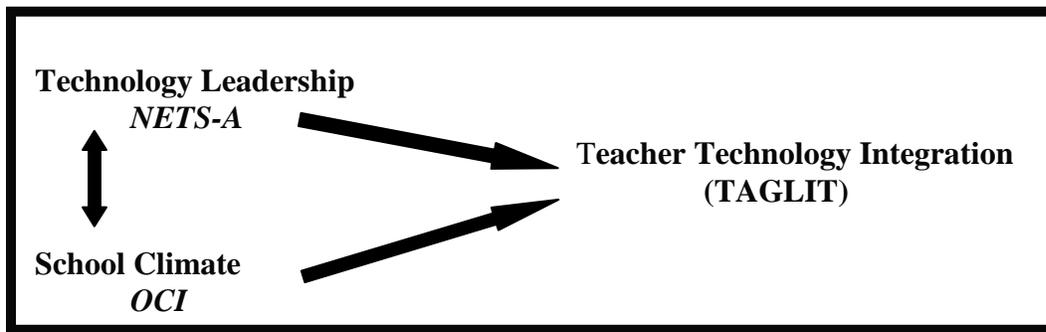
Figure 2. Relationship of NETS-A survey to OCI survey to TAGLIT survey.

Statistical Treatment

This descriptive correlational study used correlations among the composite measures and

multiple regression analysis to identify the extent to which technology leadership and school

climate influence technology integration.

CHAPTER 4

RESULTS

Introduction

The goal of this study was to identify the extent to which teachers' integration of technology in their classroom is influenced by the campus-level leaders' adherence to the National Educational Technology Standards for Administrators (NETS-A) and the overall school climate. This chapter presents the results of the analyses performed to test the three hypotheses of this study:

H1: The more technological leadership from administrators, the higher the level of teachers' use of technology.

H2: The more technological leadership from administrators, the better the school climate.

H3: The more technological leadership from administrators and the better the school climate, the higher the level of teachers' use of technology.

Initially, descriptive statistics are presented for the variables examined in this study. Each of these three hypotheses is addressed, and the chapter ends with a summary of findings.

Table 1

Characteristics of Schools

Clayton County Public Schools	*N*
Number of Schools in District	59
Enrollment of all Schools	52,328
Number of Participating Schools in the Study	32
Enrollment of Participating Schools	28,137
Total Number of Teachers in Participating Schools	2,200
Total Number of Administrators in Participating Schools	99
Number of Teachers Sampled	968
Number of Administrators Sampled	44

Research Population

Data from 32 schools were used in this study. There were 19 elementary schools, 9 middle schools, and 4 high schools. A total of 483 teachers responded to the TAGLIT survey about their technology skills, use, and constructivists' pedagogies, whereas 485 teachers responded to the OCI survey concerning school climate. There were 44 administrators who completed the NETS-A survey about technology leadership. The average population at each school consisted of 651 students for elementary, 779 for middle schools, and 1,469 for high schools. Total teacher population of the 32 schools was 2,200 teachers, along with 99 principals and assistant principals.

Research Process

Prior permission was obtained from the district's research department of Clayton County Public Schools (see Appendix A). In the 32 participating schools a total of 2,200 teachers and administrators were given an opportunity to complete the surveys; the response rate was a little less than 50% with 1,014 returning the surveys.

To prevent bias, the teachers' surveys and consent forms were placed in plain envelopes and were randomized prior to distribution. The administrator consent forms and the NETS-A survey were placed in a white envelope. The teachers received either the TAGLIT or the OCI survey, not both. The surveys were distributed to teachers so that individual teachers completed only one measure, thus keeping the variables separate and enhancing the school as the unit of analysis. The administrators were given the NETS-A survey.

The teachers and administrators of the participating schools received envelopes containing the consent forms and surveys at their schools during a regularly scheduled faculty meeting in the spring of 2009. The media specialist at each school served as the facilitator and was responsible for administering the survey. He/she distributed the consent forms and the surveys, explained the consent form, gave brief instructions on completing the surveys, and collected materials. The media specialists returned the completed surveys to this researcher.

Descriptive Statistics

Descriptive statistics for the measures of collegial leadership, professional teacher behavior, achievement press, institutional vulnerability, teachers' technology use and integration, and administrators' technology use and knowledge are shown in Table 2.

Table 2

Descriptive Statistics for Composite Measures

School Climate	*N*	Min.	Max.	*M*	*SD*
Collegial Leadership	32	2.17	3.35	2.93	.29
Professional Teacher Behavior	32	2.67	3.71	3.04	.23
Achievement Press	32	2.21	3.25	2.65	.25
Institutional Vulnerability	32	1.67	2.98	2.32	.28
Teachers' Use of Technology	32	2.31	3.04	2.72	.17
Technological Leadership from Administrators	31	2.12	4.31	3.40	.56

n = 32 schools.

Cronbach α (internal consistency) reliability coefficients for the climate subtests (collegial leadership, professional teacher behavior, academic press, and environmental press), teachers' technology use and integration, and administrators' technology use and knowledge are presented in Table 3. For collegial leadership (.79), professional teacher behavior (.77), teachers' technology use and integration (.93), and administrators' technology use and knowledge (.94), the reliability coefficients were adequate. For achievement press (.62) and institutional vulnerability (.61) the reliability coefficients were somewhat below the desired level. The low reliability of these scales is a limitation of this study and is discussed in the next chapter.

Table 3

Reliability Coefficients for Composite Measures

School Climate	n	Number of Items.	Cronbach's α
Collegial Leadership	484	7	.79
Professional Teacher Behavior	485	7	.77
Achievement Press	483	8	.62
Institutional Vulnerability	483	5	.61
Teachers' Use of Technology	483	35	.93
Technological Leadership from Administrators	44	35	.94

Table 4 shows the correlations among the composite measures in this study, based on the school-level data. Collegial leadership was positively correlated with professional teacher behavior ($r = .38$, $p = .032$), indicating that schools with higher scores on the collegial leadership scale tended to have higher scores on the professional teacher behavior scale. Collegial leadership scores were also positively correlated with teachers' technology use and integration scores ($r = .49$, $p = .004$), indicating that schools with higher collegial leadership scores tended to have higher teachers' use of technology scores. Professional teacher behavior scores were positively correlated with achievement press scores ($r = .63$, $p < .001$), indicating that schools with higher professional teacher behavior scores tended to have higher achievement press scores. Finally, institutional vulnerability scores were negatively correlated with

technological leadership from administrators scores ($r = -.47$, $p = .008$), indicating that schools with higher levels of institutional vulnerability tended to have lower scores on technological leadership from administrators.

Table 4

Correlations Among Composite Measures

	1.	2.	3.	4.	5.	6.
1. Collegial Leadership	1.00					
2. Professional Teacher Behavior	**.38***	1.00				
3. Achievement Press	.32	**.63***	1.00			
4. Institutional Vulnerability	.18	-.08	.22	1.00		
5. Teachers' Use of Technology	**.49***	-.14	-.24	.14	1.00	
6. Technological Leadership from Administrators	-.02	.08	-.21	**-.47***	-.11	1.00

$n = 32$ schools
*$p < .05$

Research Question 1

The first research question of this study was, Is technological leadership from administrators predictive of teachers' use of technology? It was hypothesized that the more technological leadership from administrators, the higher the level of teachers' use of technology. In order to test this hypothesis, the correlation between technological leadership from administrators and teachers' use of technology was computed. This correlation is presented in Table 4, which shows a correlation of -.11 ($p = .570$). This correlation was not statistically

significant, and therefore the first hypothesis of this study was not supported. The answer to the first research question is that technological leadership from administrators was not predictive of teachers' use of technology.

Research Question 2

The second research question of this study was, Is technological leadership from administrators predictive of school climate? It was hypothesized that the more technological leadership from administrators, the better the school climate. The correlations between technological leadership from administrators and the four school climate scores were used to test this hypothesis. Table 4 shows that technological leadership from administrators was not significantly correlated with collegial leadership ($r = -.02$, $p = .922$), professional teacher behavior ($r = .08$, $p = .669$), or achievement press scores ($r = -.21$, $p = .250$). However, technological leadership from administrators was negatively correlated with institutional vulnerability ($r = -.47$, $p = .008$). The negative correlation indicates that schools with more technological leadership from administrators had lower levels of institutional vulnerability. Therefore, the second hypothesis was partially supported, and the answer to the second research question is that technological leadership was predictive of institutional vulnerability but was not predictive of the other measures of school climate.

Research Question 3

The third research question of this study was, Is technological leadership from administers and school climate predictive of teachers' use of technology? It was hypothesized that the more technological leadership from administrators and the better the school climate, the higher the level of teachers' use of technology. In order to test this hypothesis, a multiple regression analysis was performed with technological leadership from administrators and school

climate scores as predictors of teachers' use of technology. Table 5 shows the results of this regression analysis. Overall, the regression model was statistically significant, $R^2 = .48$, Adjusted $R^2 = .37$, $F(5, 25) = 4.58$, $p = .004$. Individually, only achievement press was statistically significant in this regression model ($\beta = -.43$, $p = .044$). The negative regression coefficient indicates that higher levels of achievement press were associated with a lower levels of teachers' use of technology. Therefore, the third hypothesis was partially supported. The answer to the third research question is that technological leadership from administrators was not predictive of teachers' use of technology, but one of the school climate scales, achievement press, was negatively predictive of teachers' use of technology.

Table 5

Results of Regression Analysis of Predictors of Teachers' Use of Technology

Predictors	B	SE_B	β	t	p
Constant	2.70	.49		5.48	$< .001$
Collegial Leadership	.40	.09	.68	4.24	$< .001$
Professional Teacher Behavior	-.06	.16	-.08	-.37	.712
Achievement Press	-.30	.14	-.43	-2.12	.044
Institutional Vulnerability	.00	.11	.00	.02	.986
Technological Leadership from Administrators	-.06	.05	-.18	-1.05	.302

Note. $R^2 = .48$, Adjusted $R^2 = .37$, $F(5, 25) = 4.58$, $p = .004$.

Summary of Findings

The first research question of this study was, Is technological leadership from administrators associated with teachers' use of technology? The results show that the answer to this research question was "no," that technological leadership from administrators was not associated with teachers' use of technology. The second research question of this study was, Is technological leadership from administrators predictive of school climate? The answer to this question was that technological leadership was predictive of institutional vulnerability but not the other measures of school climate. The third research question was, Is technological leadership from administrators and school climate correlated with teachers' use of technology? The results showed that technological leadership from administrators was not correlated with teachers' use of technology, but that achievement press, one of the measures of school climate, was negatively correlated to teachers' use of technology, indicating that schools with higher levels of achievement press tended to have lower levels of teachers' use of technology.

CHAPTER 5

DISCUSSION

Introduction

This chapter presents the findings, discussion, and recommendations of the current study. The intention of the study was to explore the relationship of technology leadership and school climate to teachers' use of technology. The first section of this chapter will present a brief overview of the study, including the population surveyed, problems addressed, the purpose of the study, the theoretical and practical significance, the conclusions drawn from the literature review, a brief review of the methodology, and a discussion of the findings. Next the implications of the results of the study are presented. The limitations of the study are then reviewed, and recommendations are made both for educational practice and for future research. Finally, the chapter includes a statement of conclusions.

Overview of Study

The participants in this study consisted of 968 teachers and 44 administrators in 32 schools in the Clayton County Public School District in Clayton County, Georgia, during the 2008-2009 school year. The schools were used as the unit of analysis.

Data were collected using three instruments. The National Educational Technology Standards for Administrators (NETS-A) survey was administered to the principals and assistant principals of the 32 schools. Data were collected from the teachers of the corresponding schools using two other instruments: the Taking a Good Look at Instructional Technology (TAGLIT) survey, and the Organizational Climate Index (OCI) survey. This study hypothesized that

70

administrators' knowledge as measured by NETS-A, and a positive school climate as measured by the OCI contributes to teachers' integration of technology as measured by TAGLIT. The data were collected during a regularly scheduled faculty meeting at each school.

Administrators play a crucial role in determining how well technology is implemented in our schools. The review of the literature pointed to an abundance of evidence that pointed to the importance of the leader's role in implementing and sustaining technology implementation. However, the literature found that currently, leadership attributes cover a wide variety of areas, and no one leadership style has been identified to effectively cope with a changing technical environment.

Few procedures exist today in K-12 education to prepare school leaders to understand and espouse innovative technologies (Dikkers, Hughes, & Scott, 2005). Administrators often feel stuck in a "no man's land" as they recognize the need for technology but have not settled on best practices for its implementation. Administrators who lack a clear definition of technology leadership behaviors have the option of relying on the standards put forth by the ISTE. The NETS-A as proposed by the ISTE serve as suggested guidelines for administrators integrating technology in their school. These standards allow administrators to determine what they need to know and what they need to be able to do effectively in order to fulfill their responsibilities as the technology leader (Knezek, 2002).

Research suggests that if technology leaders expect teachers to integrate technology, they should attend to all aspects of technology leadership. Administrators willing to align themselves with the six NETS-A Standards (leadership and vision; learning and teaching; productivity and professional practice; support, management, and operations; assessment and evaluation; and social, legal, and ethical) issues of technology leadership, which draw on the areas of leadership

71

and vision, should result in quality support for teachers' technology integration (ISTE NETS-A, 2002).

The literature also revealed that the environment in which technology takes place is equally important. Effective technology leadership is most likely achieved when the principal seeks to promote a positive school climate (Davidson & Olsen, 2003). Davidson and Olsen suggested that the change posed by the integration of technology within the range of social practices may present challenges for leaders. However, they recognized that the success of leadership in introducing technology will be mediated by a climate that may be resistant to change.

On one hand, research on effective principal leadership describes the principal as a curriculum leader, and on the other as a manager of interpersonal relations and resources. Tarter, Sabo, and Hoy (1995) stressed the principal's role as a manager of interpersonal relations. They described the main task of the principal as providing a supportive environment, in which teachers are not afraid to make mistakes, don't feel at-risk, can develop open professional and collegial relations, and can trust the principal and other teachers. The role of the principal in developing new practices in technology will be both structural and social, and consequently technology leadership and school climate were used to understand the teachers' use of technology.

The purpose of this study was to address how the two constructs of technology leadership and school climate work together in promoting teachers' technology integration. The analysis was based on the following research questions:

RQ1. Will administrators' technology leadership form a composite positively related to teachers' technology integration?

RQ2. Will administrators' technology leadership and school climate positively correlate to teachers' technology integration?

RQ3. Will administrators' technology leadership and school climate contribute to teachers' technology integration skills, use, and constructivist pedagogies?

Findings

In this section, findings for each of three research questions are reviewed. The first research question of this study was, Is technological leadership from administrators associated with teachers' use of technology? The results show that the answer to this research question was "no," technological leadership from administrators was not associated with teachers' use of technology.

The second research question of this study was, Is technological leadership from administrators predictive of school climate? The answer to this question was "yes," technological leadership was predictive of institutional vulnerability but not the other measures of school climate.

The third research question was, Is technological leadership from administers and school climate correlated to teachers' use of technology? The results show that technology leadership from administrators was not correlated to teachers' use of technology, but achievement press, one of the measures of school climate, was negatively correlated to teachers' use of technology, indicating schools with higher levels of achievement press tended to have lower levels of teachers' use of technology.

Discussion

As a result of this study, this researcher identified six conclusions:

1. Principals' technology leadership is not positively correlated to teachers' technology integration in this study.

2. Teachers are reluctant to integrate technology in their daily lessons.

3. School climate mediates the relationship between technology leadership and technology integration.

4. Teachers are experiencing general vulnerability from outside forces and specifically in relation to principals' technology leadership.

5. Teachers' technology integration as an instructional strategy needs to be viewed in a wider context of pedagogical thought.

6. There is a need for additional staff development for administrators and teachers.

Theoretically, this study should demonstrate how leadership behavior and school climate explain the implementation of technology. In part it did, and in part it did not. The first conclusion of this study is that principals' technology leadership is not positively correlated to teachers' technology integration. As the review of the literature predicted, the success of technology integration strongly depends on leadership. However, in this study, the findings indicate no significant correlations between technology leadership and teachers' technology use.

The second conclusion of this study is that teachers are reluctant to integrate technology in their daily lessons. This conclusion was drawn from the data showing achievement press, one of the subtests of the OCI, which was negatively predictive of teachers' use of technology. It indicates that schools with higher levels of achievement press tended to have lower levels of teachers' use of technology. By definition, achievement press describes a school that sets high

but achievable academic standards and goals. In this setting, a student's academic success depends on an environment of persistency and striving to achieve that should result in respect for each other and their teachers. Parents, teachers, and the principal exert pressure for high standards and school improvement (Hoy & Sabo, 1998).

Several reasons may account for teachers' reluctance to integrate technology Although teachers set high academic standards for their students, they are not yet convinced that integrating technology will enhance these achievement goals. Clearly, the teachers feel what they *do* matters, yet because of the uncertainty of how integrating technology may affect student achievement, they may be unwilling to make changes. This is in keeping with research by Casey and Rakes (2002) that showed that teacher concerns about technology integration may not have been addressed because of the emphasis placed on student achievement. Teachers are under pressure for students to achieve. If their concern about technology and how to use it to enhance student achievement is not first addressed, then teachers may discontinue its use.

Another reason for teacher viewing technology integration negatively as it relates to student achievement is their concerns about change. According to Yukl (2006), resistance to change is a natural reaction by people who want to protect their self-interest and sense of self-determination. Change can be positive or negative. In Yukl's finding, the teachers' negative reaction to technology integration brought to their classroom may be caused by the lack of evidence to indicate that these technological innovations are effective.

Teachers do not discount their principal's knowledge and support of technology integration; they do believe it is important and worthy of consideration. However, the concern teachers currently hold is that their method works, and what the principal proposes with new

technologies may not. The teachers are making a professional judgment within their group that overrides the technical knowledge of the principal.

The third conclusion of this study is that school climate mediates the relationship between technology leadership and technology integration. This conclusion is supported by collegial leadership, one of the subtests of the OCI, correlating with professional teacher behavior. This correlation indicates that schools with higher scores on the collegial leadership scale tended to have higher scores on the professional teacher behavior scale. Collegial leadership is directed toward meeting the social needs of the faculty and achieving the goals of the school. This style of leadership involves the principal treating teachers as professional colleagues, by being open, egalitarian, and friendly, but at the same time setting clear teacher expectations and standards of performance (Hoy & Sabo, 1998). Professional teacher behavior is marked by respect for colleague competence, commitment to students, autonomous judgment, and mutual cooperation and support (Hoy & Sabo, 1998).

This finding indicates that teachers see themselves as professionals; they are respected for what they do, and have gained the trust of their administrator. Tarter and Hoy (1988) suggested that principals' relationship to teachers must be one of trust. The concepts of leadership and organizational climate are intertwined (Kozlowski & Doherty, 1989). MacNeil and Delafield (1998) argued that principals must first create a supportive environment to achieve full technology integration. In support of this idea, the high correlation of collegial leadership to professional teacher behavior indicates that the principal is meeting the needs of the teachers on a social level, and the climate is one of mutual respect. Also, the teachers are free to participate in decision-making, and believe they are positioned on the frontline to make judgments about what they expect of their students and about what goes on in the school.

76

This idea leads to the next finding in which professional teacher behavior scores positively correlated with achievement press scores. Results indicate that schools with higher professional teacher behavior scores also tended to have higher achievement press scores. According to Hoy and Woolfolk (1993), when teachers exhibit professional behaviors and are working in a healthy school climate, it leads to teacher self-efficacy and the belief that they can positively influence student learning.

The fourth conclusion of this study is that teachers feel generally vulnerable to outside forces and specifically to principals' technology leadership. This conclusion resulted from the institutional vulnerability scores, a subtest of the OCI, being negatively correlated with technological leadership. Scores indicate that the more technological leadership from administrators, the lower the levels of institutional vulnerability. Institutional vulnerability is the extent to which the school is susceptible to outside forces such as a few vocal parents, influential community groups, or the local school board. Technological leadership identifies the knowledge and skills that constitute the core of what every K-12 administrator needs to know to effectively lead technology integration. Figure 3 shows the relationship between institutional vulnerability and administrators' technology use and knowledge.
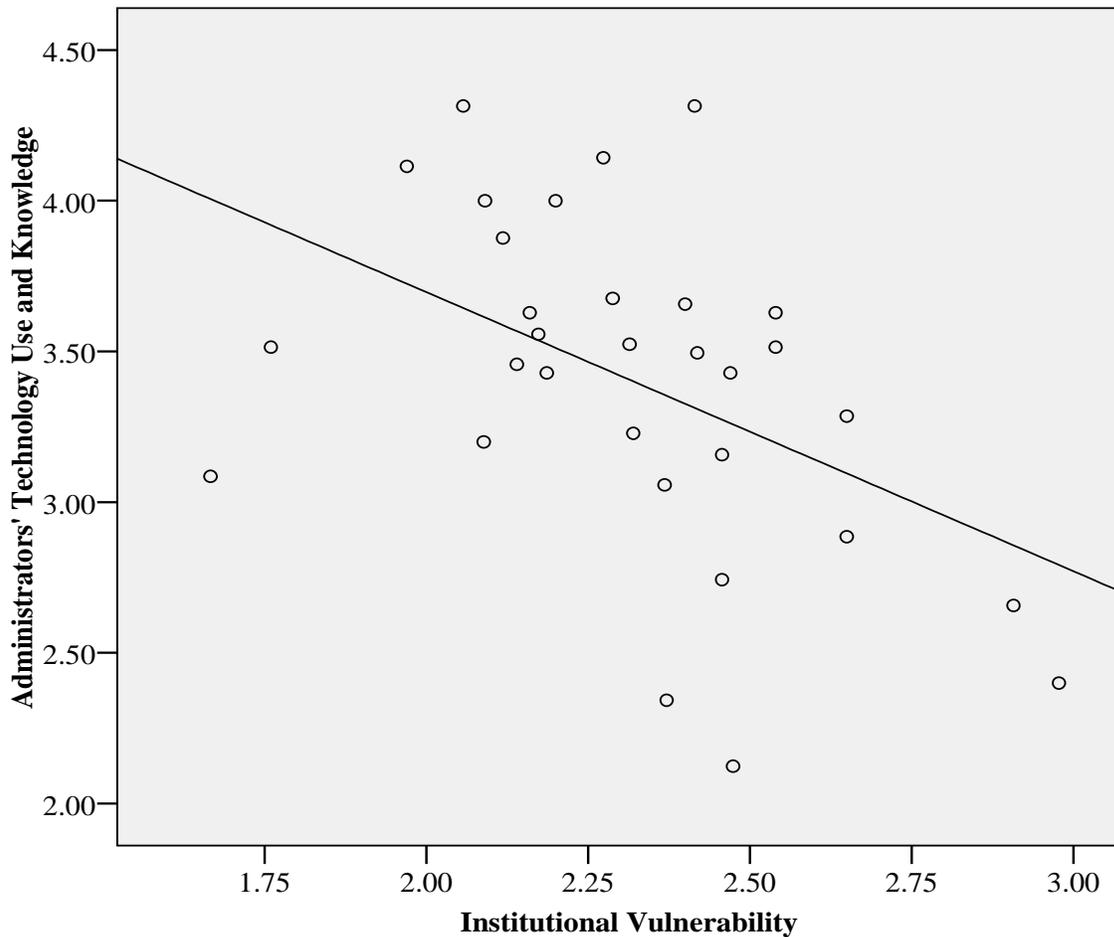
Figure 3. Scatterplot of the relationship between institutional vulnerability and administrators' technology use and knowledge.

An explanation for this finding reveals that teachers do view their principal as competent when it comes to their technology leadership. The lower scores in institutional vulnerability mean that teachers feel some protection from outside influences. However, although they acknowledge their principal's support of technology, there remains some feeling of vulnerability toward technical systematic change affecting their classroom strategies.

Finally, in this study, the vulnerability teachers are feeling has been heightened by this school district's addition of new technologies. During the school year 2008-2009, Clayton County Public Schools introduced new technologies called the 21st Century Classroom Initiative. This initiative involved adding to every classroom a mounted LCD projector, a pull down screen,

interactive school pad, student response system, and software to be used with the teacher's laptop. Teachers and principals have received only one day in-service for the operation of each of these technologies. Teachers are feeling pressured to integrate these new technologies into daily instructional use.

Conclusion five indicates that teachers' technology integration as an instructional strategy needs to be viewed in a wider context of pedagogical thought. Indications are that principals lack the knowledge to lead and support technology integration. The question remains, What will help administrators and teachers feel more confident as they move toward integrating technology?

The findings indicate that teachers view technology as a tool rather than an instructional strategy. Teachers have not yet embraced the idea of changing their pedagogy associated with technology in education. This finding is supported by Hughes and Zachariah's (2001) research stating, "For technology to be used successfully as an instructional tool in the classroom, teachers must be willing and able to construct pedagogically sound reasons for doing so" (p. 346).

Although teachers have the support of their principal, they are afraid to risk making these changes. Implementing technology is not just about using technology but about creating student-centered, constructivist learning environments. Wherever technology is used just as a tool, more training in using technology as a constructivist teaching strategy is needed (Hughes & Zachariah, 2001) . Teachers have not had a sufficient amount of staff development to cope with the technology changes the district has initiated. As Guskey (2003) insisted, professional development that is closely related to the new innovation is clearly essential in any systematic change effort within an organization. Because the appropriate time and amount of staff development has not been devoted to the use of these technologies, teacher concerns remain.

79

Readiness to change their teaching strategies using these technologies has not been fully integrated into their daily fabric of teaching; hence, the resistance to do so.

The sixth and final conclusion is that additional staff development for administrators and teachers is needed. Administrators have not been given appropriate amounts of training for the new technologies. They are asking the teachers to integrate technologies they do not fully understand themselves.

The NETS-A standard of Assessment and Evaluation emphasizes the need for technology leaders to be involved in an on-going assessment of their own administrative uses of technology along with their faculty. Continuing evaluation is imperative to prepare for professional development of the leader and the faculty (Dempsey, 1999).

Limitations of the Study

The following are limitations of this study drawn from this researcher's findings and discussions:

1. The results of the study must be generalized with caution because one school district, Clayton County Public Schools, located in Clayton County, Georgia, was used.

2. There is the possibility of self selection. Administrators most interested in technology may have responded to the surveys.

3. Finally, this study did not examine any teacher perceptions of their principal as a technology leader or the design of the school.

Implications for Practice

More and more technology is going to schools. Today's society has placed pressure on schools to make sure students are prepared to compete globally. To this end, many school boards and school districts hold firm to the belief that schools must incorporate and make available

state-of-the-art technologies to every student. However, how to best bring about this major reform and how to define the principals' role remains unclear.

Research in this study provided an abundance of evidence suggesting that leadership is the key element in school reform (Bass & Riggio, 2005; Fullan, 2002; Leithwood, Jantzi, & Steinbach, 1999; Riley, 2000; Senge, 1990; Yukl, 2006). Yet attention to providing school leaders with the necessary technology skills needed to successfully integrate technology has been neglected. Thus, administrators are ill equipped to help teachers, which ultimately results in students not realizing technology's full potential.

If we really want to understand the contribution integrating technology in the classroom can make, we have to first understand how it is integrated into the educational process. Administrators can begin by following the standards put forth by NETS-A. According to Guskey (2005), "Standards offered educators a direction for reform initiatives by providing consensus about what is important for students to learn and what skills they should acquire" (p. 36). To develop this understanding will require studies of classroom practice that document ways teachers and students use technology as a tool among other tools (digital and non digital). These studies will need to demonstrate how integrating technology in the classroom grows and changes over time.

Davidson, McNamara, and Grant (2001) suggested that principals must become more willing to use technology themselves, increase their knowledge of what it takes to support the technology, and be more open to new professional development strategies. Guskey (2003) argued that staff development must become more scientifically research based and less opinioned and event driven. He suggested starting backward by beginning with what you want to accomplish, wasting less time, and keeping focused on where it should be: on student learning.

81

According to Dexter, Anderson, and Ronnkvist (2002), quality technology professional development is defined by the following: (1) access to one-on-one personal guidance and help; (2) frequent teacher participation in technology-oriented professional support among teacher peers; (3) professional development content focused on instruction and integration; and (4) access to resources. In their study of quality technology support, they found that if administrators expect teachers to integrate technology, they must attend to the instructional components of technology and not just the operational components.

Creighton (2003) proposed that "successful principals as technology leaders are those who decide to focus and concentrate on how to best intersect technology with teaching and learning" (p. 93). Professional development opportunities that get at the heart of instruction delivered in a school environment that supports technology will enable principals to empower teachers' technology implementation.

Recommendations for Future Research

More research is needed to learn about what technology leaders are doing and should be doing in order to advance effective technology use in schools. It may prove beneficial for district leaders and building level administrators to become familiar with the International Society of Technology in Education (ISTE) standards for technology. ISTE standards include standards for students, teachers, and administrators. Becoming familiar with these standards could provide a model for effective technology staff development.

There is also a need to better understand how principals serving as "exceptional technology leaders" can help others utilize effective strategies. Principals must exemplify the attributes suggested throughout this study, be prepared to flexibly adapt to new technologies, and welcome the challenge of providing technology leadership in their schools.

Further research is needed to examine the relationship between teachers' knowledge of technology operations and their ability to integrate technology for content-focused learning. Again, principals as technology leaders must seek to understand all of the components in the educational system needed to lead technology integration as an instructional strategy that includes teachers.

It may be helpful to conduct regular evaluations into the perceptual orientations of the districts' technology plan and how administrators become more harmonious in making decisions about technology. By working with each other to provide the needed resources, support, and in-service training for teachers, successful technology integration can be achieved.

Finally, the findings and conclusion of this research study support previous studies on the topic of technology leadership. The methodology used in this study may be of interest to other groups of researchers interested in the relationship of technology leadership and school climate toward teachers' technology integration.

<div align="center">Conclusions</div>

School districts across the country are making important decisions about how best to employ technology in the classrooms. The majority of today's administrators recognizes technology's importance; however most do not possess the expertise necessary to effectively integrate technology.

This study explored the relationship of technology leadership as aligned with the six NETS-A standards and school climate to teachers' technology integration. The research indicates that technology leadership is an important factor in getting teachers to integrate technology. The findings of this study showed the following:

1. Technology leadership did not make a significant difference in regard to teachers' technology integration.

2. Teachers exhibit professional behaviors and place emphasis on high academic standards for their students, but most are reluctant to integrate technology because of their concerns about maintaining academic standards and this may prevent technology integration.

3. School climate mediates the relationship between technology leadership and technology integration.

4. In schools where there was more technology leadership, teachers indicated that they were less susceptible to outside pressures.

5. Administrators and teachers need more staff development.

Principals are challenged to gain the expertise needed to become the technology leader. The data revealed the school climate as mediating between leadership and integration; teachers' exhibit professional behaviors and place emphasis on high academic standards for their students, but most are reluctant to integrate technology.

Principals do recognize their role as leaders of technology but most lack a clear understanding of how to cultivate change to make technology meaningful in the teaching and learning process. This supports Flanagan and Jacobsen's (2003) view, which stated, "Very few principals have themselves used computers in meaningful ways with children, and therefore lack the requisite pedagogical vision and experience to guide teachers" (p. 134). As a concluding thought, administrators need to adhere to a framework such as the NETS-A so they can develop technology competencies, become mentors, and advocate for teachers to integrate technology in sequential ways in the educational process. To do this means administrators need a positive approach that promotes a spirit of cooperation among all stakeholders.

84

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APPENDIXES

APPENDIX A

APPROVAL TO CONDUCT RESEARCH

Clayton County Public Schools
Department of Research, Evaluation and Assessment
157 Smith Street, Jonesboro, Georgia 30236   (678) 479-4516   Fax (678) 610-1484

JOHN W. THOMPSON, Ph.D.
Superintendent

CHANDRA F. JOHNSON, Ph.D.
Executive Director

DEBORAH J. BASS, Ph. D.
Chief Academic Officer of Elementary Instruction

July 15, 2008

Ms. Cathy Terry
9133 Dover Street
Lithia Springs, GA 30122

RE: "Technology Leadership, School Climate, and Technology Integration: A Correlation Study in K-12 Public Schools"

Dear Ms. Terry:

Thank you for your continued interest in conducting research in Clayton County Public Schools (CCPS). Your revised research application was reviewed by the CCPS Research Review Board (RRB) on <u>July 14, 2008</u>. Approval to conduct research in CCPS is based on a number of criteria outlined in a review template utilized by the RRB and embedded in the "CCPS Research Guidelines and Application Procedures." The criteria include: (a) the alignment of the proposed study to the current CCPS goals and objectives, (b) soundness of the proposed methodology and research design, and (c) clearly stated procedures for adhering to ethical research guidelines. Based on the RRB's use of a standardized scoring rubric, your request to conduct research in CCPS was:

☑ Approved. You may begin data collection.
☐ Approved, pending revisions.
☐ Denied

A final copy of the completed research report must be submitted to my attention at the Department of Research, Evaluation, and Assessment within twenty calendar days (08/21/08) of the proposed project completion date (08/01/2008) you provided in your application. If your "proposed project end date" changes, you must notify my administrative assistant, Mrs. Kelly Morris, in writing and provide the revised completion date and the reason(s) for the change. *Please note that any changes to the approved research study require a RRB review and approval prior to implementation.* I look forward to receiving a copy of your final report, and I will be contacting you to present your study to a select group of CCPS educators once the final report is received.

Best of luck and congratulations!

Respectfully,

Joe M. Nail, Ph.D.
Director of Research, Evaluation and Assessment

CC: Dr. C. John Tarter, ctarter@bamaed.ua.edu
       Principals of study
       Dr. Chandra F. Johnson, Executive Director for Research, Evaluation, and Assessment
       Mark Rettig, Director of Information Services (MIS)

CCPS RRB Approval, Letter   Page 1 of 1

APPENDIX B

NATIONAL EDUCATION TECHNOLOGY STANDARDS FOR ADMINISTRATORS

National Education Technology Standards for Administrators

Average time to complete the assessment is about 10 minutes. Circle the number that best describes your technology experience.

I. Leadership & Vision

1. To what extent did you participate in your districts or school's most recent? technology planning process?

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

2. To what extent did you communicate information about your districts or school's? technology planning and implementation efforts to your school's stakeholders?

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

3. To what extent did you promote participation of your school's stakeholders in the technology planning process of your school or district?

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

4. To what extent did you compare and align your district or school technology plan with other plans, including district strategic plans, your school improvement plan or other instructional plans?

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

5. To what extent did you advocate for inclusion of research-based technology practices in your school improvement plan?

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

6. To what extent did you engage in activities to identify best practices in the use of? technology (e.g. reviews of literature, attendance at relevant conferences, or meetings of professional organizations)?

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

II. *Learning and Teaching*

1. To what extent did you provide or make available assistance to teachers to use technology for interpreting and analyzing student assessment data?

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

2. To what extent did you provide or make available assistance to teachers for using student assessment data to modify instruction?

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

3. To what extent did you disseminate or model best practices in learning and teaching with technology to faculty and staff?

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

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

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

5. To what extent did you organize or conduct assessments of staff needs related to professional development on the use of technology?

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

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

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

III. *Productivity & Professional Practice*

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

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

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

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

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

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

4. To what extent did you use technology-based management systems to access student records?

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

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

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

IV. Support, Management, & Operations

1. Support faculty and staff in connecting to and using district and building-level technology systems for management and operations (e.g., student information system, electronic grade book, curriculum management system)?

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

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

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

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

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

4. To what extent did you ensure that hardware and software replacement/upgrades were incorporated into school technology plans?

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

5. To what extent did you advocate at the district level for adequate, timely, and high-quality technology support services?

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

6. To what extent did you investigate how satisfied faculty and staff were with the technology support services provided by your district/school?

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

V. Assessment & Evaluation

1. To what extent did you promote or model technology-based systems to collect student assessment data?

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

2. To what extent did you promote the evaluation of instructional practices, including technology-based practices, to assess their effectiveness?

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

3. To what extent did you assess and evaluate existing technology-based administrative and operations systems for modification or upgrade?

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

4. To what extent did you evaluate the effectiveness of professional development offerings in your school to meet the needs of teachers and their use of technology?

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

5. To what extent did you include the effective use of technology as a criterion for assessing the performance of faculty?

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

VI. Social, Legal, & Ethical Issues

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

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

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

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

3. To what extent were you in involved in enforcing policies related to copyright and intellectual property?

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

4. To what extent were you involved in addressing issues related to privacy and online safety?

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

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

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

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

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

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

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

Thank You

APPENDIX C

TAGLIT ASSESSMENT

TAGLIT ASSESSMENT

Taking a Good Look at Instructional Technology (TAGLIT)

Darken the circle next to your answer

Section 0

1. **What grade level do you mainly teach?**
   - ○ **Elementary School**
   - ○ **Middle School**
   - ○ **High School**

Section I. Your Technology Skills

Basic Tools: How far along are you in learning to?

2. **Use a word processor to create documents?**
   - ○ **I don't know how to do this.**
   - ○ **I can do this, sometimes need help.**
   - ○ **I can do this independently.**
   - ○ **I can teach others how to do this.**

3. **Use a spreadsheet to enter and calculate numbers?**
   - ○ **I don't know how to do this.**
   - ○ **I can do this, sometimes need help.**
   - ○ **I can do this independently.**
   - ○ **I can teach others how to do this.**

4. **Use a spreadsheet to create graphs?**
   - ○ **I don't know how to do this.**
   - ○ **I can do this, sometimes need help.**
   - ○ **I can do this independently.**
   - ○ **I can teach others how to do this.**

5. **Use a database to enter information?**
   - ○ **I don't know how to do this.**
   - ○ **I can do this, sometimes need help.**
   - ○ **I can do this independently.**
   - ○ **I can teach others how to do this.**

6. **Use a database to search for and sort information and create reports?**
   - ○ **I don't know how to do this.**
   - ○ **I can do this, sometimes need help.**
   - ○ **I can do this independently.**
   - ○ **I can teach others how to do this.**

Multimedia Tools: How far along are you in learning to?

7. <u>Use drawing or painting software to create pictures?</u>
- ⭘ **I don't know how to do this.**
- ⭘ **I can do this, sometimes need help.**
- ⭘ **I can do this independently.**
- ⭘ **I can teach others how to do this.**

8. <u>Use a digital camera and/or scanner to get pictures into the computer?</u>
- ⭘ **I don't know how to do this.**
- ⭘ **I can do this, sometimes need help.**
- ⭘ **I can do this independently.**
- ⭘ **I can teach others how to do this.**

9. <u>Use presentation software to create a presentation?</u>
- ⭘ **I don't know how to do this.**
- ⭘ **I can do this, sometimes need help.**
- ⭘ **I can do this independently.**
- ⭘ **I can teach others how to do this.**

10. <u>Use multimedia software to create a product?</u>
- ⭘ **I don't know how to do this.**
- ⭘ **I can do this, sometimes need help.**
- ⭘ **I can do this independently.**
- ⭘ **I can teach others how to do this.**

Communication Tools: How far along are in learning to:

11. <u>Use email to send and receive messages?</u>
- ⭘ **I don't know how to do this.**
- ⭘ **I can do this, sometimes need help.**
- ⭘ **I can do this independently.**
- ⭘ **I can teach others how to do this.**

12. <u>Use web authoring software to create a web page?</u>
- ⭘ **I don't know how to do this.**
- ⭘ **I can do this, sometimes need help.**
- ⭘ **I can do this independently.**
- ⭘ **I can teach others how to do this.**

Research and Problem-Solving tools: How far along are in learning to:

13. Use CD-ROMS to gather information?
- ○ I don't know how to do this.
- ○ I can do this, sometimes need help.
- ○ I can do this independently.
- ○ I can teach others how to do this.

14. Use online reference software to gather information?
- ○ I don't know how to do this.
- ○ I can do this, sometimes need help.
- ○ I can do this independently.
- ○ I can teach others how to do this.

15. Use a search engine to find information on the World Wide Web?
- ○ I don't know how to do this.
- ○ I can do this, sometimes need help.
- ○ I can do this independently.
- ○ I can teach others how to do this.

16. Use graphic organizer and/or systems thinking software to solve problems?
- ○ I don't know how to do this.
- ○ I can do this, sometimes need help.
- ○ I can do this independently.
- ○ I can teach others how to do this.

Section 2: Your Technology Use in Teaching and Learning

17. Overall, how far along are you in using technology to enhance teaching and learning?
- ○ I do not use it in teaching and learning.
- ○ I am beginning to understand its relevance in teaching and learning and to experiment using it with students
- ○ I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.
- ○ I naturally include it in teaching and learning and use it in powerful ways.

18. Basic Tools: How far along are you in enhancing teaching and learning using: word processing?
- ○ I do not use it in teaching and learning.
- ○ I am beginning to understand its relevance in teaching and learning and to experiment using it with students
- ○ I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.

19. <u>spreadsheets?</u>
   - ○ **I do not use it in teaching and learning.**
   - ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
   - ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
   - ○ **I naturally include it in teaching and learning and use it in powerful ways.**

20. <u>databases?</u>
   - ○ **I do not use it in teaching and learning.**
   - ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
   - ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
   - ○ **I naturally include it in teaching and learning and use it in powerful ways.**

Multimedia Tools: How far along are you in enhancing teaching and learning using:

21. <u>drawing or painting software?</u>
   - ○ **I do not use it in teaching and learning.**
   - ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
   - ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
   - ○ **I naturally include it in teaching and learning and use it in powerful ways.**

22. <u>video production?</u>
   - ○ **I do not use it in teaching and learning.**
   - ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
   - ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
   - ○ **I naturally include it in teaching and learning and use it in powerful ways.**

23. <u>digital cameras and/or scanners?</u>
   - ○ **I do not use it in teaching and learning.**
   - ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
   - ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
   - ○ **I naturally include it in teaching and learning and use it in powerful ways.**

24. <u>presentation software?</u>
- ○ **I do not use it in teaching and learning.**
- ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
- ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
- ○ **I naturally include it in teaching and learning and use it in powerful ways.**

25. <u>multimedia software?</u>
- ○ **I do not use it in teaching and learning.**
- ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
- ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
- ○ **I naturally include it in teaching and learning and use it in powerful ways.**

Communication Tools: How far along are you in enhancing teaching and learning using:

26. <u>email?</u>
- ○ **I do not use it in teaching and learning.**
- ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
- ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
- ○ **I naturally include it in teaching and learning and use it in powerful ways.**

27. <u>electronic or online references?</u>
- ○ **I do not use it in teaching and learning.**
- ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
- ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
- ○ **I naturally include it in teaching and learning and use it in powerful ways.**

28. <u>the World Wide Web for research?</u>
- ○ **I do not use it in teaching and learning.**
- ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
- ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
- ○ **I naturally include it in teaching and learning and use it in powerful ways.**

29. <u>graphic organizer and/or systems thinking software?</u>
- ○ **I do not use it in teaching and learning.**
- ○ **I am beginning to understand its relevance in teaching and learning and to experiment using it with students**
- ○ **I make a conscious effort to include it in teaching and learning and to integrate it effectively in lessons.**
- ○ **I naturally include it in teaching and learning and use it in powerful ways.**

Section 3: Technology and the Way Your Classroom Works

As a result of your use of technology in teaching and learning, are you more inclined to?

30. <u>Involve students in cooperative, not competitive, learning?</u>
- ○ **No**
- ○ **Yes, Somewhat**
- ○ **Yes, Quite a Bit**
- ○ **Yes, Very Much**

31. <u>Involve students in activities that require higher level thinking skills?</u>
- ○ **No**
- ○ **Yes, Somewhat**
- ○ **Yes, Quite a Bit**
- ○ **Yes, Very Much**

32. <u>Involve students in interactions with the world outside of school?</u>
- ○ **No**
- ○ **Yes, Somewhat**
- ○ **Yes, Quite a Bit**
- ○ **Yes, Very Much**

33. <u>Involve students in interdisciplinary activities?</u>
- ○ **No**
- ○ **Yes, Somewhat**
- ○ **Yes, Quite a Bit**
- ○ **Yes, Very Much**

34. <u>Involve students in activities that they find engaging?</u>
- ○ **No**
- ○ **Yes, Somewhat**
- ○ **Yes, Quite a Bit**
- ○ **Yes, Very Much**

35. <u>find the time to work with students who need extra help?</u>
- ○ **No**
- ○ **Yes, Somewhat**
- ○ **Yes, Quite a Bit**
- ○ **Yes, Very Much**

36. <u>serve as a coach, not lecturer or whole-group discussion leader?</u>
- ○ **No**
- ○ **Yes, Somewhat**
- ○ **Yes, Quite a Bit**
- ○ **Yes, Very Much**

Thank you for your assistance.

APPENDIX D

ORGANIZATIONAL CLIMATE INDEX

Organizational Climate Index

DIRECTIONS: THE FOLLOWING ARE STATEMENTS ABOUT YOUR SCHOOL. PLEASE INDICATE THE EXTENT TO WHICH EACH STATEMENT CHARACTERIZES YOUR SCHOOL BY CIRCLING THE APPROPRIATE RESPONSE.

R O =Rarely Occurs **S O** =Sometimes Occurs **O** =Often Occurs **V F O** =Very Frequent Occurs

1. The principal explores all sides of topics and admits that other opinions exist…
RO   SO   O   VFO

2. A few vocal parents can change school policy…………………….……………
RO   SO   O   VFO

3. The principal treats all faculty members as his or her equal…………................
RO   SO   O   VFO

4. The learning environment is orderly and serious………………………………..
RO   SO   O   VFO

5. The principal is friendly and approachable……………….….............................
RO   SO   O   VFO

6. Select citizens groups are influential with the board...........………................
RO   SO   O   VFO

7. The school sets high standards for academic performance.............................
RO   SO   O   VFO

8. Teachers help and support each other………...........……………..............….
RO   SO   O   VFO

9. The principal responds to pressure from parents……………………………..
RO   SO   O   VFO

10. The principal lets faculty know what is expected of them.............…..............
RO   SO   O   VFO

11. Students respect others who get good grades..........….................................
RO   SO   O   VFO

12. Teachers feel pressure from the community.………....................................
RO   SO   O   VFO

13. The principal maintains definite standards of performance............…………..
RO   SO   O   VFO

14. Teachers in this school believe that their students have the ability to achieve academically…………………………………………………………………………..
 RO   SO   O   VFO

15. Students seek extra work so they can get good grades…………....................
RO   SO   O   VFO

16. Parents exert pressure to maintain high standards……………....................
RO   SO   O   VFO

17. Students try hard to improve on previous work..
RO   SO   O   VFO

18. Teachers accomplish their jobs with enthusiasm...
RO   SO   O   VFO

19. Academic achievement is recognized and acknowledged by the school..........
RO   SO   O   VFO

20. The principal puts suggestions made by the faculty into operation…..............
RO   SO   O   VFO

21. Teachers respect the professional competence of their colleagues.................
RO   SO   O   VFO

22. Parents press for school improvement………………………………..................
RO   SO   O   VFO

23. The interactions between faculty members are cooperative…………...........
RO   SO   O   VFO

24. Students in this school can achieve the goals that have been set for them
RO   SO   O   VFO

25. Teachers in this school exercise professional judgment…………………….
RO   SO   O   VFO

26. The school is vulnerable to outside pressures………………………..............
RO   SO   O   VFO

27. The principal is willing to make changes……………………………..............
RO   SO   O   VFO

28. Teachers "go the extra mile" with their students…………………………….
RO   SO   O   VFO

29. Teachers provide strong social support for colleagues……….…………
RO   SO   O   VFO

30. Teachers are committed to their students……………………………………
RO   SO   O   VFO