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Principals' Perceptions of Technology Implementation in High Schools and Their Effects on Leadership

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Principals' Perceptions of Technology Implementation in High Schools and Their Effects on Leadership

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by

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ABSTRACT

School administrators who are able to implement technology in their schools must see themselves as technology leaders; they are enthusiastic when it comes to using technology in professional development. This research study investigated how high school principals' attitudes and perceptions of effectively organizing, utilizing, and implementing technology in order to support the mission and vision of the school by using the National Educational Technology Standards for Administrators (NETS-A) and Performance Indicators for Administrators (ISTE/NETS-A). For school administrators to provide effective leadership in their schools in the 21st century, they must possess knowledge and understanding of the issues and the capabilities of technology. This qualitative research study presents and explains the ten participant administrators' missions and visions of technology implementation in urban high schools. The findings from this study suggest that while principals wanted to be technology leaders, they felt they were inadequately prepared and lacked the professional development to fully carry out the role. Principals must be leaders of technology in their mission and vision for their schools. They must get involved with planning and infrastructure to ensure their schools are properly equipped with technology tools. Also, there is a need for administrators to become well-trained and well-versed in technology, allowing for better support and guidance for teachers charged with implementing technology. This study will contribute to the current body of literature by corroborating the importance of following the ISTE/NETS-A to ensure a successful technology program. It will fill a gap in the literature by addressing attitudes and perceptions of administrators toward technology leadership. It will address strategies of technology integration and how principals transform their schools through technology leadership to become visionary administrators. It is no secret that technology is here and here to stay. It is constantly changing,

and for any organization to be viable in the 21st century, it must stay current and knowledgeable regarding technology. In education, administrators must take the lead in learning, understanding, sharing, and implementing technology at their schools or face an inevitable demise in competitiveness in a future society.

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I would like to express my love, commitment, and gratitude to my parents, Tecumseh Phillip Perkins, Sr. and Mary Lee Holloway Perkins, who were behind me in pursuing a higher education. May they both rest in peace, and I know that they are smiling down on me.

DEDICATION

I dedicate this dissertation to my lovely daughter, Kimeka Toya Jacobs-Williams. I salute you for being the first grandchild of the Perkins family to break the cycle by completing a college degree on May 7, 2011. I have always tried to instill the benefits and expectations of achieving a higher education in you. As time has passed you have completed a master's degree on December 15, 2012. You have surpassed my expectations. Thank you for being a great daughter. I love you. This is a life-long dream that has come true: my completing a doctorate and your graduating from college. I have overcome my joy by having faith.

Love Always,

Momma

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Chapter One begins with an introduction and background that describes the technology leadership of high school principals in the 21st century. It will consist of a statement of the problem, the purpose of the study, research questions, and the significance of the study. The theoretical framework and theoretical sensitivity used in the study are also included. This chapter will also present the limitations and delimitations of the study along with key terms and definitions. The last section offers a summary and the organization of this dissertation.

Introduction

School administrators today face a different set of challenges than their predecessors. In 1987, computers were introduced to the Little Rock School District in junior high schools; over the years, they were put in high schools and elementary schools, as well as in central administrative offices. There was little professional development training on technology in the 1980s.

Literature suggests that one of the major challenges is infusing technology into the curriculum. Administrators who are able to implement technology in their schools must see themselves as technology leaders (Demski, 2012). Education is an area where technology can enhance the overall experience for teachers and students, and society is embracing this idea (Flemmer, 2007). In fact, one of the most powerful factors in increasing the use of technology in teaching, learning, and student achievement is societal pressure on administrators to use technology as an implementation tool (O'Dwyer, Russell, & Bebell, 2004). Because they have little experience with new technology, however, very few school administrators claim to be

technology experts, yet in the 21st century technology is in every field of education (Gosmire & Grady, 2007).

Dias (2001) believes it is important for school administrators and others in leadership roles to understand what constitutes best practices in technology integration. While principals may be willing to implement technology, they need more custom professional development to help them move to effective implementation (Papaioannou & Charalambous, 2011). As instructional leaders of the building, principals who do not understand how to use technology cannot properly evaluate the use of it by teachers for instruction and students for achievement. As technology evolves, administrator skill sets must change to remain current (Jerald, 2009).

A consortium that consists of educators and business leaders created a set of standards to help administrators and all educators across the country implement technology effectively (ISTE/NETS, 2009). These technology standards for the 21st century are referred to as National Educational Technology Standards for Administrators (NETS-A) and International Society for Technology in Education (ISTE, 2006). These standards for school administrators include the following components to ensure proper implementation: effective planning, consistent support, and a clear vision. The standard pertaining to planning ensures proper implementation by preparing the school members to utilize technology effectively. The support standard indicates that administrators support teachers as they effectively implement technology curriculum. The vision standard is promoted by the administrators and involves all the stakeholders to achieve the goal of technology implementation in the building.

This study explored the attitudes and perceptions related to how high school administrators supported their technology mission and vision by investigating how they organized, planned, and implemented technology. There is a plethora of research suggesting

advancement in the use of technology for teachers and students (Thacker, 2007), but research pertaining to the perceptions of administrators has been lacking. Furthermore, because administrators are leaders of the educational system, it is important to look at their knowledge bases and uses of technology as their perceptions and usage are indicative of their vision, organization, and planning.

Statement of the Problem

Studies have shown that administrative support is significant to the implementation of technology in schools (Gibson, 2001; Kincaid & Felder, 2002; Shoffner, 2001). Research indicates that school administrators should play a critical role in the successful integration of technology in their schools (Twomey, Schamburg, & Zieger, 2006). Today, principals should have a clear vision of their role in technology integration and implementation because it is an essential function of their duties as instructional leaders. However, the problem is that principals may not understand their role in implementing technology. Some lack the necessary skills and knowledge to effectively function as technology leaders. According to Townsend (1999), principals need to reclaim their roles as educational leaders in technology. Maintaining a firm leadership role in technology would help administrators keep their schools current (Jerald, 2009).

Purpose of the Study

Principals must have a vision concerning the implementation of technology in order to become more effective instructional leaders (McLeod, Logan, & Allen, 2002). This vision means they must be committed to the effective use of technology. The purpose of this study was to investigate how high school principals' perceptions and attitudes enabled them to effectively organize, utilize, and implement technology.

Research Questions

The research questions in this study are:

1) What are principals' attitudes toward technology use?
2) How do principals describe their support of teachers in the use of technology?

Significance of the Study

Technology skills are required of school administrators in order for them to lead in a technology-rich educational environment. One of the major reasons for the lack of technology development for principals has been the struggle to identify the administrator knowledge base needed in technology and the management of technology in the school situation. A focus group conducted by the University of Texas at Austin and Texas A&M University identified the lack of an agreed-upon knowledge base as a primary factor in the lack of school administrator development in technology (Awalt & Jolly, 1999).

The old-fashioned classroom atmosphere is becoming obsolete with the onset of virtual classrooms or schools. Students can be taught by someone in another country by teleconference, eBooks are replacing textbooks, and texting is producing another set of vocabulary in this global society (Young, 2010). This study looked at high school administrators and discussed their mission and vision of technology in their schools and how technology changed over the years. It addressed the attitudes and perceptions surrounding the use of technology in the classroom and its implementation as an instructional tool.

Theoretical Framework

National Education Technology Standards were created in 1998 to guide teaching and learning and to set goals for administrators, teachers, and students. Technology Standards for School Administrators (TSSA Collaborative, 2001) relates with the standards created by the

International Society for Technology and Education (ISTE, 2006) in the NETS Projects. TSSA was implemented in 2001 by the TSSA Collaborative. The ISTE is an organization committed to promoting the educational curriculum of technology to improve learning and support teaching with technology. ISTE writes standards and guidelines for administrators, teachers, and students in technology. The ISTE standards are representations to inform educational stakeholders of what indicates effective school leadership for comprehensive and effective use of technology in the schools (ISTE, 2006; Twomey, et al., 2006). The 2009 ISTE and NETS-A theoretical framework is based upon the premise that our educational system is attempting to keep pace with the impact computers are making in society. The ISTE 2009 standards are:

- Visionary leadership
- Digital age learning culture
- Excellence in professional practice
- Systemic improvement
- Digital citizenship

These national standards are used to reform school improvement (ISTE, 2006; Twomey, et al., 2006).

In the 21st century, principals focused on the NETS-A incorporated by ISTE for implementing technology in the school buildings. A principal in the information digital age is an instructional leader, a visionary leader, and able to use technology for management. However, principals may not fully understand their roles and the expectations for successful integration of technology in their schools. Davis (2008) suggested that although most have had training in technology, many school principals are not comfortable with technology or knowledgeable enough about technology integration techniques. Because principal training programs normally

do not focus on the skills identified by NETS-A, administrators should refocus their professional development programs. Administrative training courses are not teaching school principals or central office administrators how to use technology effectively. Despres (2011) suggested education and training for administrators were somewhat inadequate because they did not prepare administrators to meet these standards. Many school administrators received their degrees before computer technology made its impact, and many colleges and universities do not have up-to-date courses that cover the scope of administrative functions that can be managed by computers. Some of the program inadequacies are:

- No technology vision
- Lack of technology use
- Time management
- Instructional resources are not being implemented properly (Richardson, Flora, & Bathon, 2012).

Based on the ISTE/NETS-A (2009), principals need a training program that better prepares them to be technology leaders. Principals need to be able to articulate a mission and vision surrounding technology implementation in their schools (Richardson, Flora, & Bathon, 2012). They must understand how to:

- Plan a technology mission and vision
- Adequately demonstrate technology skills
- Be familiar with updated software and hardware
- Be familiar with infrastructure and planning

The ISTE issued its NETS-A in recognition of the challenge for administrators to understand effective technology integration. Figure 1 shows the NETS-A standards. NETS-A is

a protocol describing what technology-savvy school leaders ought to know and be able to do. These standards state that educational leaders should be able to "facilitate and support collaborative technology-enriched learning environments and provide for learner-centered environments that use technology to meet the individual and diverse needs of learners" (ISTE/NETS, 2009, p. 8).

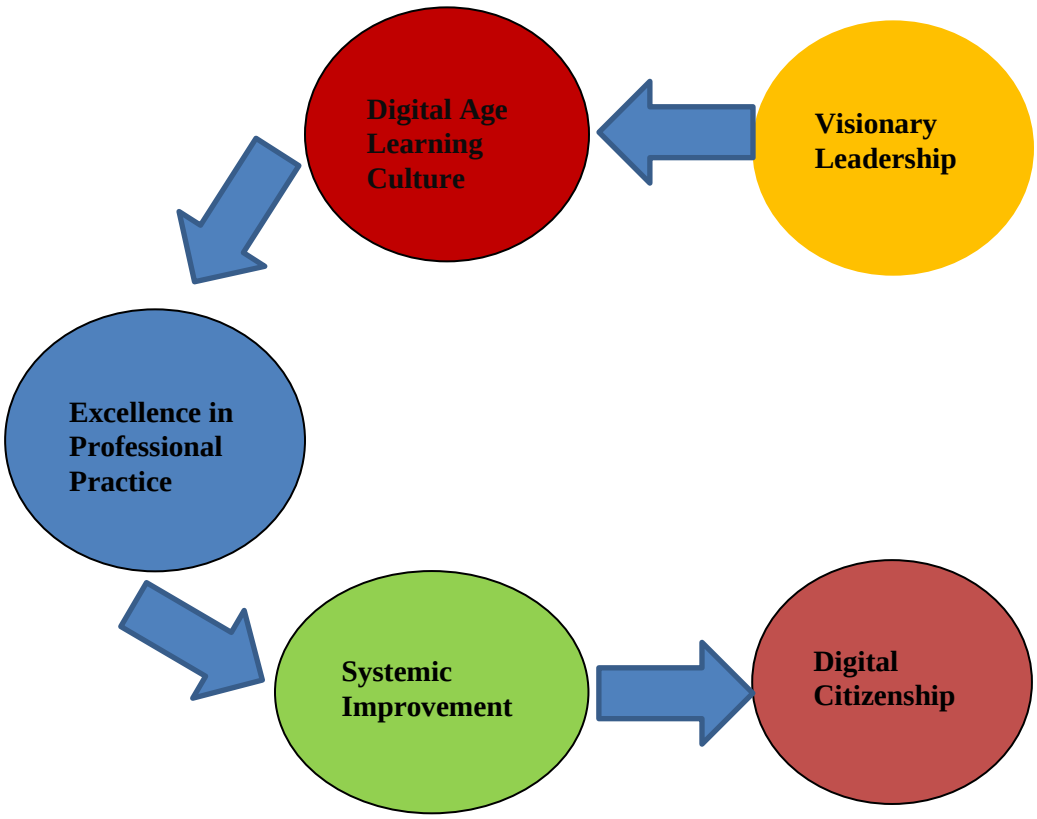

Figure 1. ISTE/NETS Educational technology standards for administrators (2009). Standards*A @ 2009 International society for technology in education.

A theoretical concept is the standards for advanced programs in educational leadership for principals, superintendents, curriculum directors, and supervisors that are used by universities in the administrative and instructional pedagogy to strengthen the technology knowledge base. An education leader promotes the success of every student by advocating, nurturing and sustaining a school culture and instructional program conducive to student learning and staff

professional growth. According to the National Policy Board for Educational Administration (2002) and Educational Leadership Policy/Interstate School Leaders Licensure Consortium (2008), there are several program quality indicators that meet the standards for school building leadership and school district leadership. Here are some of the Educational Leadership Policy (ELCC 2008) standards: (1) Create a comprehensive, rigorous, and coherent curricular program – the development of quality curriculum including principles/theories of learning, appropriate instructional techniques, mentoring and evaluating instruction, using data and technology to improve instruction, and allocating resources (p. 13). (2) Promotes the use of the most effective and appropriated technologies to support teaching and learning – Technology as pedagogical and administrative tools. Support initiative that utilizes technologies for improved teaching and student achievement (p. 22). (3) Monitor and evaluate the management and operational systems – Use technology to manage school operations (p. 23).

Another consortium, Interstate School Leaders Licensure Consortium (2014), states the primary goal of these standards is to articulate what effective leadership looks like in a transformed public education system (p. 6). According to ISLLC, a transformed public education system requires a new vision of leadership. The standards are a statement of this vision for leadership, regardless of the educator's roles (p. 6). The 2014 ISLLC Standards are designed to be used by all education leaders, whether at the school or district level, and those in all leadership positions. These standards should guide the work of principals, superintendents, and teacher leaders in urban, rural, and suburban districts. States should use the standards to inform preparation of education leaders and to identify the leadership qualities they seek in all education leaders – principals, assistant principal, and teacher leaders. States and districts can then use this knowledge to recruit and hire candidates who possess the requisite characteristics.

Also, Interstate School Leaders Licensure Consortium (ISLLC, 2014) standards provide guidance to state policymakers as they work to improve education leadership preparation, licensure, evaluation, and professional development. Standard 1: Vision and Mission. An educational leader promotes the success and well-being of every student by ensuring the development, articulation, implementation, and stewardship of a child centered vision of quality schooling that is shared by all member of the school community. This function acts in ways that consistently reflect the school's district, vision, mission, and values. Standard 2: Instructional Capacity. An educational leader promotes the success and well-being of every student by enhancing instructional capacity (16). Standard 3: Instruction. An educational leader promotes the success and well-being of every student by promoting instruction that maximizes student learning. This function employs technology in the service of teaching and learning. Standard 4: Curriculum and Assessment. An educational leader promotes the success and well-being of every student by promoting robust and meaningful curricula and assessment programs. This function ensures authentic learning and assessment experiences (p. 17). Standard 5: Operations and Management. An educational leader promotes the success and well-being of every student by ensuring effective and efficient management of the school or district to promote student social and academic learning. Generally these functions support staff with human, financial, and technological resources. Also many of the standards use technology at the school or district to improve operations and enable others to understand and support relevant laws and policies (p. 19).

Theoretical Sensitivity

In qualitative studies, the researcher is the primary instrument for data analysis and data collection (Marshall & Rossman, 1999). As such, my role as researcher was to be that of

interviewer. I conducted one-on-one interviews with each high school building principal to acquire information about their experiences with technology implementation. Specifically, I wanted to give clear explanations of the questions, help principals feel comfortable, and operate the audiotape for data collection.

Professional experience. My background in education is versatile and has provided the professional knowledge to conduct this study. Thirty years ago, I began my professional career at a federal agency working with computers. After several years at this agency, I started a second career teaching at the junior high school and college levels using technology with computers.

Personal experience. My job as Jobs for Arkansas Graduates (JAG) Specialist requires the use of a database to house all JAG information from student job placement to service learning projects. After inputting data all year long on the students in my school JAG program, I am able to run end of year reports using the E-NDMS JAG database, which analyzes the students' core competencies, employability skills, college placement, student retention, follow-up status, and barriers. My technology experiences led me to inquire about how high school principals implement, integrate, and use technology. I believe it is important to improve administrators' familiarity with the infrastructure, curriculum integration, professional development, and technology needs of a high school for student achievement. There is limited research on secondary principals' attitudes and implementation of technology in schools.

Knowledge of the literature. Afshari, Bakar, Luan, Samah, and Fooi (2009) stated as the demand for schools to become more effective and efficient learning communities' increases, the need for principals to cultivate broad-based, skillful participation in the work of leadership is essential. They should be proficient in the use of technology and then provide leadership in the

use of technology for administrative, instructional, and learning functions. School administrators at all levels are critical players in providing leadership in order for an effective, integrative, student-centered use of technology to occur in the K-12 arena, (Rodriguez, 2012).

Analytic rigor. In this study, a phenomenological approach provided an important base for the emerging themes. Polkinghorne (1989) described a phenomenological study as the meaning of the lived experiences for several individuals about a concept or the phenomenon. The theoretical framework of this study is important for the research because it will focus on the lived experiences of its participants. The collected data was analyzed for reliability and validity for each facet. The International Society for Technology in Education (ISTE) developed National Education Standards for Administrators (NETS-A) in 2009 that provided the indicator for knowledge and skills of the school principal, focusing on visionary leadership, a digital-age learning culture, excellence in professional practice, systemic improvement, and digital citizenship.

Limitations of the Study

According to Creswell (2008), "limitations are potential weaknesses or problems with the study identified by the researcher" (p. 207). There are several limitations to this study.

1) Data collected from the interviews are based on individual administrator perceptions.
2) The sample is not randomly selected. Ten administrators from two technology magnet schools and eight regular schools were selected; thus, the results may be applicable only to those settings.

Delimitations of the Study

According to Bryant (2004), "delimitations are the factors that prevent you from claiming that your findings are true for all people in all times and places" (p. 57). This study did not

presume to generalize to all administrators or all schools. Instead, it depicts a specific phenomenon at a given time.

1) This study was restricted to high school administrators in grades 9-12 and in the same urban county.
2) Administrators were in their specific buildings for fewer than five years.

Definition of Terms

The following operational definitions were adopted for the purposes of this study:

E-Rate: The common name for the Schools and Libraries Universal Service Support Mechanism. E-Rate provides discounts to assist schools and libraries in obtaining affordable telecommunications services and Internet access. The Universal Service Administrative Company (USAC) administers the program at the direction of the Federal Communications Commission (FCC) (Arkansas Department of Education, 2008a).

Instructional Leadership: The traditional school leadership duties, such as teacher evaluation, budgeting, scheduling, and facilities maintenance with a deep involvement in specific aspects of teaching and learning. Effective instructional leaders are intensely involved in curricular and instructional issues that directly affect student achievement (Cotton, 2003). Research conducted by King (2002), Elmore (2000), and Spillane, Halverson, and Diamond (2000) confirmed that this important role extends beyond the scope of the school principal to involve other leaders, as well. One of the key players in instructional leadership is the principal.

Instructional Technology: The media born of the communications revolution that can be used for instructional purposes alongside the teacher, textbook, and blackboard. It is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication

and employing a combination of human and nonhuman resources to bring about more effective instruction (Chyung, 2008).

Principal: The principal provides leadership that is both task-oriented and relations-oriented. The principal has influence with his or her superiors as well as the ability to exercise independent thought and action. Some characteristics of an effective school principal have been identified as goals and production emphasis, power and strong decision making, effective management, and strong human relations skills (Bossert, Dwyer, Rowan, & Lee, 1982). In most public schools, principals need a master's degree in educational administration or educational leadership. Some states also require a license, and it is mandatory to pass a test (Bureau of Labor Statistics, 2010-2011).

Professional Development: A coordinated set of planned learning activities that are based on research, are standards-based, and are continuous (Arkansas Department of Education, 2005).

Technology: Dugger (2001) stated the definition of technology includes a broad spectrum of artifacts, ranging from the age-old (flint tools, wheels, levers) to the high-tech (computers, multimedia, biotechnologies).

Technology Leadership: This "refers to a person who has internalized the complexity of effective technology integration [i.e., knows what it looks like] and who exercises influence [i.e., provides supports] to ensure that the various factors are in place" (Ertmer, Bai, Dong, Khalil, Park, & Wang, 2002, p. 5).

Technology Literacy: The ability of an individual, working independently and with others, to responsibly, appropriately, and effectively use technology tools to access, manage, integrate, evaluate, create, and communicate information (University of Texas at Austin, 2007).

Summary

In today's education system, technology must be wide-spread for effective implementation in the schools for student learning and curriculum. Many school administrators have challenges with technology that require changes in their skill sets. This study explored the attitudes and perceptions related to how high school administrators supported their technology missions and visions by investigating how they organized, planned, and implemented technology. The purpose of this study was to investigate how high school principals' perceptions and attitudes enabled them to effectively organize, utilize, and implement technology. Some administrators find it difficult to implement technology uses in schools to foster proper implementation. Thus, there is a need to enhance the administrator's knowledge base to help principals effectively implement technology in their schools.

Organization of the Dissertation

In Chapter Two, the literature review discusses the existing research surrounding technology implementation. Chapter Three outlines the methodology used to discuss the attitudes and perceptions of the principals toward technology as well as their support for teachers who use technology. This includes a description of the site, methods for collecting data, and data analysis. Chapter Four reports the findings and data analysis that enabled me to describe the attitudes of administrators towards the use of technology in their schools. Finally, Chapter Five includes my conclusions and recommendations.

Chapter Two:

Literature Review

Introduction

The literature review explains the relationship between principals' technology leadership and the theoretical framework provided by International Society for Technology in Education (ISTE) (ISTE, 2006) and the National Education Technology Standards for Administrators (NETS-A) (ISTE/NETS-A, 2009). The ISTE/NETS-A included visionary leadership, digital-age learning culture, excellence in professional practice, systemic improvement, and digital citizenship. The standards were created by a collaborative group of private companies known as Samsung, Microsoft, SMART, DELL, and Pearson. The intent of this chapter is to review and discuss recent empirical research and policies that help focus on educational technology best practices. As the instructional leader of the school, the high school principal is recognized as a significant part of the technology leadership and integration process. According to the educational leadership policy standards (ISLLC, 2008) deals with an education leader promoting the success of every student by advocating, nurturing and sustaining a school culture and instructional program conducive to student learning and staff professional growth. Technology is a priority in making effective principals leaderships in the field of a digital age. The final section will focus on principals' professional development training as well as policies and procedures.

Organization of the Chapter

The literature review begins with an explanation of the search strategy. An overview of the National Education Technology Plan that is presented, followed by a look at the school leader technology implementation, principals' attitude in technology leadership implementation

and administrators' support of technology integration as evidenced to ISTE and NETS-A. The chapter continues with a review of the administrators and the technology classroom, professional development, and technology resources. Finally, a summary to the chapter is given.

Search Strategy

Though this is the age of modern technology, there is little research available on how high school principals use technology in their buildings. The research process included an extensive search in the Google search engine as well as EBSCOHost using the expanded word phrases "principals' attitudes toward technology," "role of principal leadership in technology," "principal implementation of technology in schools," and related themes. The number of articles was limited with only the "principals' attitudes toward technology," "technology leadership," and their similar themes. Further limiting the search was the exclusion of a collection of research papers and articles written before 2001 due to the rapid change of educational technology. The empirical study research was based on implementation, attitudes, perceptions, support, technology leadership, and professional development for principals. This literature was identified using educational journals such as the *Journal of Research on Technology in Education* and the *National Association of Secondary School Principals (NASSP) Bulletin.* The literature was also completed by using the university and local libraries, ProQuest Dissertations and Theses, Google Scholar, and ERIC.

National Education Technology Plan

The National Education Technology Plan (NETP) (2010) released by the U.S. Department of Education list five goals along with recommendations. The goals are learning, assessment, teaching, infrastructure, and productivity. The NETP recommends the transformation of our education system to change and become clear about the outcomes,

collaborate to revamp structures, evaluate our performance, and hold ourselves accountable for progress. The NETP is important because it is a resource for the education system and the workforce in using technology to work and play in our day-to-day operations. These recommendations are similar to the skills of the NETS-A standards (U.S. Department of Education, 2010), which are located in Appendix A.

School Leader Implementation

In her dissertation, Watts (2009) addressed the NETS-A as a predictor of implementation. Watts did a quantitative study that used three instruments to collect data using the NETS-A survey, the Taking a Good Look at Instructional Technology (TAGLIT) survey, and the Organizational Climate Index (OCI) survey. Her research indicated that administrators' leadership and a positive school climate as measured by the OCI both contribute to integration of technology. When an administrator has a leadership style that is conducive to technology use and the enforcement of technology is coupled with a school climate that is receptive to using technology, then technology use will be evident. To help implement technology plans, administrators must be effective. "The most effective way school administrators can promote technology use is to themselves be knowledgeable and effective users of technology," noted Betty Kistler, a computer technology coordinator at Tuckahoe School in Southampton, New York (Starr, 2001, p. 35).

In Tweed's (2013) dissertation, she undertook a quantitative study that refers to the implementation of new technologies in the classroom. The study also focused on the age of the teacher, years of teaching experience, quality of professional development, and teacher self-efficacy as defined by Bandura (1997) to examine the manner in which these factors relate to implementing new technologies in the classroom. The study consisted of 18 difference schools

within two school districts in Tennessee. There were 321 teachers who participated in the voluntary survey. The instrument used was an online survey, which was distributed by e-mail from school principals. The instrument had questions based on a four-point Likert-type scale. The results indicated there is no significant correlation between teacher age, teacher self-efficacy, years of teaching experience, teacher gender, hours spent in technology professional development, teacher self-efficacy, teacher age and technology use in the classroom scores. Participants indicated that technology had at least somewhat impacted the way they teach in their classrooms. Lastly, findings indicated that the self-efficacy of a teacher is significantly positively related to classroom technology use of teachers.

Hughes and Zachariah (2001) conducted a study to ascertain what leadership attributes affect the integration of technology to improve teaching and learning. The research focused on the relationship and how it is affected as roles and responsibilities shift. A principal's leadership style affected the implementation of technology in a school. Facilitative leadership by the principal was seen by teachers as key to successful technology implementation (Baylor & Ritchie, 2002; Hasselbring et al., 2000; Hughes & Zachariah, 2001). Administrators who promote technology as a tool for collaboration, and stimulation for authentic learning experiences can allow for far greater student achievement than ever before (Hughes & Zachariah, 2001). The NETS-A standards provide a framework to study the attitudes and behaviors of school leaders toward implementing technology in schools.

Principals' Attitudes in Technology Leadership Implementation

Anderson and Dexter (2005) provided a narrative of a national survey that capitalizes on school leadership in technology implementation. The study approached understanding of research for student learning with implementation of technology and some indicators of

technology outcomes, such as net use, which represents teacher and student use of e-mail and the Internet, the number of teachers who are integrating technology into their curriculum and how often students use technology for their academic work. The findings suggest that although technology infrastructure is important, technology leadership is necessary for effective utilization of technology in schooling. Anderson & Dexter's (2005) findings produced little information on principals' attitudes in technology leadership implementation.

Hand and Prain (2003) stated that new technologies "contribute to a learning environment that is more responsive to an individual student's needs and interests" (p. 443). In their mixed-methods study they found that the formulation, implementation, and ongoing evaluation of the whole-school approach to using new technologies have been a major method for changed teaching, learning practices, and outcomes. Teachers and students changed their beliefs and attitudes about the nature and methods of effective teaching and learning as they have begun using graphic calculators, the Internet, Microsoft PowerPoint, and online discussion with these technologies. The use of technology was a significant learning tool for teaching the staff, resulting in increased professional standing and recognition outside the school environment. Therefore, the whole-school approach was successful in achieving its goal of redesigning a more productive learning environment through the use of new technologies, (Oblinger, Oblinger, & McNeely, 2005). Planning and strong principal leadership were major instruments in the implementation of educational goals and new technologies. The school principals' leadership had a strategic technology vision of the new technologies and how they would be implemented in a school setting. High school principals and administrators need to be aware of the newest technology available for instructional purposes.

According to Hines, Edmonson, and Moore (2008), administrators should have skills in:

- finances and purchasing agreements
- collecting information on variables
- electronic-mail and palm digital assistant (PDA)
- management of time
- multimedia presentations
- research application software
- safety policies and security issues
- staff development, infrastructure, technical support, personnel, and upgrades

Hines, Edmonson, and Moore's (2008) findings indicated that all participants (principals) communicate differently as a result of electronic communication. The time required at a computer was an issue because some of the responsibilities (such as typing letters, reading e-mails, reading budgets, and writing referrals) were time consuming for principals. An additional responsibility for principals was to have continuous access to the computer, which caused them to work longer hours to complete their duties. Electronic communication gave principals a stronger sense of community by enhancing communication in the school district.

The role of the principal changed tremendously during the 21st century. In 1983, the publication, *A Nation at Risk* influenced the traditional educational outlook by advocating an "industrial model of school leadership, which emphasized the uniform and efficient delivery of resources" (Valdez, 2004, p. 1). This publication expressed that technology illiteracy was prevalent and it was up to school leaders to provide resources that fixed the problem such as technology instruction and research studies (Valdez, 2004). Johnson (2005) stated that as technology played an ever more mission-critical role in schools, technology literacy for district,

building, and program administrators became mission-critical, as well. Principals were responsible for integrating technology to keep up with rapid societal changes.

In Bell's (2011) dissertation, he addressed the analysis of principals' perceptions of technology's influence in today's schools. The study also focused on understanding the principals' perceptions of how technology influences their daily roles as school leaders in the 21st century. His purpose of the study was to understand the importance of technology in 21st century schools and the impact it has had on principals, counselors, teachers, and students. The research consisted of a quantitative survey method and the tools consisted of qualitative open-ended questions. Participating in this study were 310 current campus principals who were in rural, suburban, and urban Texas K-12 public schools. The instruments used to collect data were a principal survey questionnaire and cognitive interview protocol. The results of the analysis indicated that 62.3% of the principals self-reported that technology had made a positive impact on their roles as principals, on the schools and on teachers, counselors, and students. Of the 35.7% of participants who believed technology had a negative impact on their campuses, over half of them reported that technology had a negative influence on their roles as principals.

For school administrators to provide effective leadership in their schools in the 21st century, they must possess knowledge and understanding of the issues and the capabilities of technology. They must use technology appropriately in the fulfillment of their roles of coordinator and communicator of school programs and activities (Richardson & McLeod, 2011).

ISTE (2009) stated that school and technology leaders should "model and promote the frequent and effective use of technology for learning" (p. 1). According to Anderson and Dexter (2005), "a school's technology efforts are seriously threatened unless key administrators become active technology leaders in a school" (p. 74). A principal needs to be a visionary, an

instructional leader, and a change agent when it comes to implementing and integrating technology in schools (Brockmier, Sermon, & Hope, 2005; Davis, 2008).

According to Goodwin, Cunningham, and Childress (2003), the role of school principal transformed into high demands on them within their job leadership functions in the 21st century because of the many stresses placed on the profession. Principals were required to be versatile leaders and take on such roles as:

- organizational leader,
- strategic leader,
- instructional leader, and
- political and community leader. (Goodwin, Cunningham, & Childress, 2003).

Though principals hold these roles, Goodwin et al. (2003) believed they must also be technology leaders in order to develop an attitude that supports technology implementation.

Akbaba-Altun (2004) conducted a study in a small city west of Turkey that explored how elementary school principals' roles related to information technology classrooms and how school principals perceived their roles and what is expected in the school. The participants included 17 school principals and 15 computer coordinators. Akbaba-Altun explained that principals had positive opinions of using computers and other educational technology equipment in education. This study ties back to technology leadership, implementation, and systemic planning in an education setting.

Serhan (2007) stated that school principals as technology leaders should make it essential to have a long-term vision, responsibility, and commitment to coordinating and allocating required resources for the school. Serhan's study focused on principals' attitudes toward the use of technology. His purpose was to measure the effectiveness of an educational technology

training workshop via investigation of the attitudes of school principals toward the use of technology in their schools and their willingness to advocate and support its use after attending the workshop. Likewise, it investigated the advantages and challenges of using computers in schools. A questionnaire was developed and administered to 200 school principals in the United Arab Emirates. The Likert Scale questionnaire was developed by the researcher based on the aim of the study. Results of this study revealed that principals had positive attitudes toward the use of technology in their schools. The principals indicated that they had learned from the workshop and that the workshop had motivated them to use new technologies in their schools. The results of the study also indicated that principals are more receptive to learning about new technology because they can implement and plan for integration for teachers to use for educational use and teach the curriculum with new technologies. If principals are comfortable with using technology, they will enforce the new equipment in their schools. Serhan's research focused on some of the issues that administrators face in implementing technology in high schools. Daniel and Nance (2002) discussed the fear older administrators bring to new professional technology learning; these principals did not want to change with the 21st century demands. Although they attended professional development training, they did not implement technology, were not held accountable, and did not transform their leadership and schools.

McLeod, Logan, and Allen (2002) conducted a study of educational leadership programs that prepare school administrators to use and enhance the use of information technology. They discovered that it is important for educational leadership programs to prepare future school administrators to facilitate effective technology integration in their schools. School administrators often lack vital knowledge of technology trends, issues, and skills; therefore, they are not effective leaders of technology management (p. 13). The NETS developed by ISTE

serve as a guide for school administrators, to use in the technological implementation of technological leadership in each state (p. 328-329). It should be important for school leaders to support professional development for improvement, changes, and best practices in school buildings, (Greaves, Hayes, Wilson, Gielniak, & Peterson, 2010).

A Saskatchewan-based research project entitled *Beyond the Mouse and Modem* (Henderson, James, & Cannon, 2003) surveyed over 2,000 Saskatchewan teachers about their knowledge and use of technology in the classroom. The survey revealed that teachers lacked the skill and knowledge levels needed for effective implementation. To better enhance learning outcomes, teachers needed to go beyond basic technologies and advance toward high-yield technology integration strategies. This skill level referred to curricular integration, not technical skills. While many barriers were suggested and to some extent will be explored here, the real issue revolved around the whole philosophy of teaching and learning and the significant impact technology had on the outcomes. Henderson, James, and Cannon (2003) provided four barriers:

- lack of leadership in the school building, where the principal was not recommending the curriculum integration but just giving a suggestion to the teachers on technology.
- lack of funding that would enable the district to update technology in the classroom.
- The vision of the principal who did not visualize technology integration to the fullest potential and did not support teacher technology use.
- The infrastructure dealing with professional development for the teachers and the comfort level of teaching with the equipment such as computer software and hardware problems.

Bailey (2000) stated the essential elements for understanding technology integration and leadership in the 21st century. These elements are located in Table 2.1**.** *Ten Essential Elements for Understanding Technology Integration and Leadership.* Bailey stated what technology

leaders need to know concerning technology integration, such as change, curriculum, ethics, infrastructure, safety and security, staff development, teaching/learning, technology planning, technical support, and technology leadership. The integration of technology into the curriculum plays an important role in terms of creating a rich teaching and learning environment. In fact, the integration of new technological developments into education should enable students to make use of new technologies just as easily as they make use of technology like books, maps and pencils (Cakir and Yildirim, 2009; Hew and Brush, 2007). Researchers stress the importance of having a sufficient number of computer teachers who embrace their profession and communicate well with other teachers (Cakir 2008; Goktas and Topu, 2012; Seferoglu, 2007), as well as the key role administrators play in the integration of technology in the schools (Afshari et al., 2008; Brockmeier et al., 2005; Kearsley and Lynch, 1992; Seferoglu, 2009).

Table 2.1

Essential Elements for Understanding Technology Integration and Leadership

10 Elements	Technology Integration
Change	Administrators should be knowledgeable of their skill level in technology.
Curriculum	Integration and team teaching.
Ethics	Technology policies and procedures should be put in place for social and legal matters.
Infrastructure	The physical environment for setting up technology use as far as wiring, furniture, acoustics, and space.
Safety and Security	How to properly type with wrist positioned and how to keep hackers from abusing your privacy.
Staff Development	Needed to update staff on the various software, hardware and electronic gadgets that are available for educational use.
Teaching/Learning	How to implement and apply integrating technology in the classroom.
Technology Planning	Empowering technology committees at the building level.
Technical Support	Hiring personnel to monitor, repair, teach, and plan for technology.
Technology Leadership	Keeping up with the information age with skills that are used to implement, plan, and articulate the use of technology.

Haughey (2006) conducted a two-year study involving interviews with 30 Canadian primary school principals about the impact of computers on their work. He explored their responses through the concepts of talk, distributed leadership, professionalization, and knowledge management. He wanted to know how they would respond to their changing expectations of leadership when learning the effectiveness of using computers. During school hours these principals spent between half a morning and half a day at the computer. Because it was not unusual for principals to spend their evenings completing computer-based work at home, it was noted by some that spending school time on the computer was easily done and they had to make conscious efforts to remove themselves from their desks.

Haughey (2006) stated when principals were asked how computers affected the "talk" of their daily administrative work, many gave responses about texting. Most concluded that texting had replaced "talk" because it was easier to obtain information around the school community by gathering and receiving information via e-mail and seeking advice on a particular student simultaneously from all teachers. Such possibilities have created a network of technological advances that have broken the traditional boundaries of expertise and enhanced teacher professionalism (Moeller & Reitzes, 2011). These communicative processes have improved the sophistication of test analysis and/or reporting practices, which, in turn, have assisted with the building strong professional practices. While some principals noted that in some situations when dealing with parents it was better to communicate verbally, some identified the effectiveness of accessing electronic student databases when dealing with parents. A number of principals agreed on the importance of maintaining face-to-face communications with parents in addition to electronic communication. On the other hand, some principals stated that because electronic communication had improved their effectiveness on administrative matters, they had more time

for face-to-face discussion with colleagues. Online repositories will enhance electronic resources and administrative documents for local educational offices. Computerized administration not only created opportunities for greater efficiency but for more transformative, distributed leadership (Haughey, 2006).

Gronn's (2003) explanation of how power was handled through communication is an interesting juxtaposition to the principals' accounts of the use of email and the push for immediacy. The recent emphasis on distributed leadership mimicked the distributive power of the network. Gronn found some evidence that schools were networks rather than hierarchies, while professionalization created communities that go beyond the limitations of the school. Knowledge management was evident both in regulated activities and in semi-structured communities used to support the dynamic structure of school life. According to Gronn (2003) "new models of schooling are emerging based on collaboration, networking and multi-working agencies (networked learning communities, partnerships, extended schools)" (p. 31-32). This type of schooling requires more responsive leadership and it is needed to traverse in a very different organization.

The purpose of Duncan's (2011) dissertation study was to determine the engagement and involvement with technology of public school administrators in Virginia. Duncan's study also compared responses reporting the most leadership involvement to those responses reporting the least leadership involvement around technology issues of public school administrators in Virginia. Duncan's dissertation design focused on a quantitative, non-experimental sample of a web-based survey and qualitative research taken by administrators in Virginia. Creswell (2003) stated that a survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. The survey instrument was the

Principals Technology Leadership Assessment (PTLA) and is research based on NETS-A and validated by the American Institutes for Research (AIR). The population of the study was members of the Virginia Association for Supervision and Curriculum Development and members of the Virginia Association of Secondary School Principals, which had approximately 208 participants. The web-based survey collected self-reported data on the technology skills and knowledge of the Virginia public school administrators. The current research study found Virginia public school administrators rating the lowest mean in the "Leadership and Vision" dimension out of the six dimensions. The six dimensions were leadership and vision; learning and teaching; productivity and professional practice; support, management, and operations; assessment and evaluation; and social, legal, and ethics issues, (ISTE, 2002). According to Duncan the study results indicated that the Virginia public school administrators are barely meeting minimum standards in five out of the six dimensions. This study recommended that the schools of education in Virginia modify their coursework for public school administrators as it relates to NETS-A. The results also indicated, when compared to other studies, little or no progress had been made in the area of public school administrator engagement and involvement in technology issues. The Virginia professional associations for public school administrators need to help change the attitudes about technology standards (Duncan, 2011).

In McKinley's (2014) dissertation, he studied the relationship of faculty demographics and attitudes toward technology integration in mid-sized northern high schools. The quantitative study was to determine if relationships existed between age, gender, tenure, and attitude toward technology, and the implementation of technology into the classroom instruction. The research design was a one-time cross-sectional survey of teachers within the district. The data collected was from the Levels of Technology Implementation survey, which included five questions about

attitude towards technology. The findings indicated that technology implementation in classroom instruction was generally deficient in this group. No significant relationships between faculty age, gender, and tenure and technology implementation existed, but attitude toward technology proved to be a significant factor for increased technology implementation into classroom instruction.

Administrators Support of Technology Integration

ISTE developed NETS-A in 2009 that provided the indicators for knowledge, skills, and support actions. As a result, the school administrators may support technology integration. The school district, the state department, and the school have to support technology in order for it to be successfully implemented and integrated (Keengwe, Kidd, & Blankson, 2008).

Slowinski (2003) stated, "administrators who implement technology effectively in their schools and communities will contribute greatly to both education and the economy in the 21st century" (p. 25). A strong link between educational technology and school leadership is necessary to support improvements in education. The expansion and growth of technology use in school has changed the responsibility and role of the principals to implement advanced, enriched curriculum integration and to be able to lead faculty and students. Principals think of technology as an essential tool for changing the way teachers teach and the way students learn (Moeller & Reitzes, 2011). However, the dichotomy is that these principals lack the understanding of how technology should be integrated into the learning environment (Slowinski, 2003). Among the challenges of technology leadership were the number of people that need to be involved in learning how to use technology, the lightening-fast speed in which technology continued to evolve, and the development of how technology was being used for educational purposes (Creighton, 2003). Creighton stated, "successful principals as technology leaders will

be those who decide to focus and concentrate on how best to intersect technology with teaching and learning" (p. 93).

There are barriers in implementing plans for technology which include cost and support of education. Funding is a big issue when it comes to keeping technology, software, and equipment up-to-date. Dragula (2005) stated, "lack of support such as money, time, and leadership, and lack of tools" (p. 4) are barriers to teachers integrating technology. The question is: how can schools obtain additional funding for technology? Presently, school administrators seek funding through community philanthropy as supplemental monies from the district, state, and federal funds. Yet, many agencies require grant applications. Administrators have little time to submit grants and may not have adequate staff to write grants. School districts partner with the private sector to fund technology for schools, foundations donate grant money to administrators and teachers to write grants. Most districts do have grant writers but some central office personnel are responsible for finding and hiring one. The purpose of the grant writer is to understand the proposal creation process for analyzing the intended audience for the proposal. The grant writer uses public and private foundations which awards billions of dollars in grants, in which sums of money are intended to advance a specific objective. Grant writers help to match funders with projects they want to support. The grant writers research, draft, and submit proposals that help organizations receive grant funding (McCann, 2014). The challenge is getting the teachers to write the grants and get them approved (Dragula, 2005).

Technology can be expensive and this is one of the barriers for keeping equipment, software, and hardware up-to-date (Butler & Sellbom, 2002). The expenditures for instructional technology need to be budgeted more adequately in order to keep up with the information age in education. Principals need to plan wisely to meet the funding for computers and also encourage

teachers to write grants for technology. The extra funding from grants, the district, and philanthropy will provide resources for purchasing. Also, gifts can be a significant source of funds to implement technology. Administrators can look for donors, foundations, or corporations to fund technology improvements (Whitehead, Jensen, & Boschee, 2003).

E-Rate is the common name for the Schools and Libraries Universal Service Support Mechanism. E-Rate provides discounts to help schools and libraries obtain reasonably priced telecommunications services and Internet access. The Universal Service Administrative Company (USAC) administers the program at the direction of the Federal Communications Commission (FCC). USAC's Schools and Library Division (SLD) administers the program, (ADE, 2008a). E-Rate is the technology plan that is submitted to the state department of education. It includes goals and strategies, professional development strategies, budget, and an evaluation plan. The goals should consist of improvement in education and how it affects achievement (Cisco, 2013). Professional development should focus on teaching strategies and how it affects and improves teaching and learning, as well as how it can be integrated with the frameworks and curriculum. The cost is high because the line items should include software, hardware, professional development, personnel, furniture, and any other services that technology supports. The evaluation process will include the types of professional development and monitoring through surveys to determine the weaknesses and strengths of technology (ADE, 2008a).

In Smith's (2011) correlational research dissertation, he focused on the effective use of technology in the classroom and the instructional technology leadership of the school principal. Principals and teachers from 37 schools in two school districts from two different states participated in the study. The 37 schools consisted of 23 elementary schools, 8 middle schools,

and 6 high schools. The instrument method used was two online surveys. Two independent variables were used for the instructional technology leadership, which were: the instructional technology leadership knowledge and skills of the principal, and support actions of the principal. The dependent variable is the effective use of technology by teachers and students in the classroom; the instruments used included: ISTE/NETS-T for teacher standards and ISTE/NETS-S for student standards. The results indicated a correlation existed among the variables for both principals and teachers for instructional technology/skills and support actions of the principal and effective use of technology in the classroom. There was a positive correlation in the effective use of technology in the classroom. The large sample size of 1,105 teachers was significantly high. The instructional technology leadership support actions of elementary principals for teachers are a predictor of effective use of technology in elementary schools at the $p = .03$ level of significance. The technology leadership support actions of middle and high school principals are not a predictor of effective use of technology in their respective schools and classrooms. This result means changing the attitudes of principal leadership to improve the school organization to make it open to new ideas. More studies are needed on secondary school principals and their role, vision, and professional development as technology leaders. Studies like mine are needed for administrators to lead in a technology-rich educational environment. This study is based on creating a principal's knowledge base to help principals' lead effective implementation in their schools. Background factors for principals such as age, years of experience, and access to technology were not significant in their instructional technology leadership ability to promote the effect use of technology in the classroom.

Administrators and the Technology Classroom

Bobbera's (2013) quantitative dissertation study focused on developing the principal's capacity to lead technology integration within the school. This action research study looked at 14 public school principals in a district that has invested financial resources in the acquisition of various instructional technologies. Principals were randomly assigned to either a control or experimental group. The experimental group participated in a series of professional development sessions focusing on technology integration pedagogy and leadership practices. The two instruments used to assess was the Principal Technology Leadership Assessment (PTLA), an assessment of the NETS-A and the Classroom Observation Tool (ICOT). The PTLA is a 35-item Likert Scale instrument that assess the principals' technology leadership preferences. The second instrument was the ISTE Classroom Observation Tool (ICOT), which is used to gather data on instructional technology use for pre- and post-treatment within this study (Center for the Advanced Study of Technology Leadership in Education, 2006). The results indicated that change recorded within the experimental group appeared to validate the assertion that a professional development program focusing on technology integration pedagogy and leadership practices can positively impact the principals' technology leadership within their schools. Technology professional development was a key factor in the increase of pedagogy information and relevant knowledge for leadership skills of the school principals. Data collected during the study supported the assertions within the literature that not only the quantity but also the quality of professional development sessions targeting pedagogy and leadership practices directly impacts integration and student achievement within the classroom.

Administrators need to model how technology impacts teaching and learning. Slowinski (2003) stated, "throughout this process, school leaders should assure teachers that the goal of

technology is to improve teaching and learning, not to replace teachers" (p. 25). The appropriate use of technology should promote innovation toward school improvement (Donovan, 1999; Slowinski, 2003). Administrators must be prepared for a significant investment of time to move technology from a part-time tool to an active tool fully integrated into the curriculum. Donovan (1999) suggested, a reform must have many of the following characteristics:

- be progressive with current methods
- be adequate with needs and expectations
- be compliant and committed to change
- be visible and modeled by staff
- be easy. (p. 2)

School leaders should concentrate on building a school context complete with as many as these characteristics as possible. An understanding of the relationship between administrative leadership styles and the implementation of technology would assist effective reform efforts, (NCREL, 2001). Technology has influenced the way education systems are run. In the 21st century technology has changed the way students learn and educators have to try and keep it current (McLeod, 2007).

O'Dwyer, Russell, and Bebell (2004) discussed how a school leader can encourage appropriate and effective use of technology:

1) Create staff buy-in in developing the technology plan.
2) Provide leadership to assist school staff with assistive technology and how to use at school, district, and statewide levels.
3) Offer interim needs assessments for staff to assess technology needs.
4) Plan professional learning following needs assessments.

5) Consider varying learning strategies (such as universal design) for diversity.
    - In terms of technology accessibility for all learners.
    - In terms of standards-based curriculum with technology infusion.
6) Celebrate effective technology use (e.g., highlight effective practices at staff meetings, bulletin board postings, peer sharing during training events, newsletter articles).
7) List and store all assistive and educational technology in the school for:
    - obtaining information,
    - monitoring usage,
    - planning for future needs, and
    - providing compliance records with Individuals with Disabilities Education Act. (p. 372)

These elements would produce a culture accepting of technology use. According to O'Dwyer et al. (2004):

> These elements through hierarchical linear regression models, practitioners, and policy makers have the potential to develop a greater understanding of the policies and practices at both the teacher, school, and district levels that facilitate the adoption of technology in the classroom to support teaching. (p. 372)

According to Lashway (2002):

> In the 21st century an effective leader demands the ability to hold a global perspective of the school while at the same time being able to identify and address all the pieces that affect programs including technology, curriculum, instructional best practice, staff and stakeholder, and managerial tasks. (p. 5)

Principals must be prepared to take on all of these roles and be effective in each if he is to be effective as a leader who brings about achievement.

Noeth and Volkov (2004) indicated that principal leadership has been described as one of the most important factors affecting the effective use of technology in classrooms. Additionally, principals who exhibit leadership are instrumental in modeling the use of technology in classrooms. They understand how technology can support best practices in instruction and assessment, and they provide teachers with guidance (NCES, 2000).

> Experts believe that increasing capacity depends on enhancing the technology skills of teachers and administrators. Many states, for example, have taken steps to provide guidelines for how to use educational technology more effectively; and 80% have developed standards for teachers and administrators that include technology. (Education Week, 2003, p. 63-64)

Older administrators have to learn how to use the new technology and not be fearful of changing times.

According to Slowinski (2003), communities throughout the country will increasingly require effective leadership in the area of technology from insightful and forward-thinking school leaders. Given these demands, administrators who implement technology effectively in their schools and communities will contribute greatly to both education and the economy in the 21st century (Slowinski, 2003). Changes in schools have been limited to "islands of excellence" rather than the transformed landscape many had anticipated from technology integration in schools (Shrum, 2005).

The National Education Association (2008) recommended that the technology available to students and teachers be compatible in general use outside of classrooms. A survey study was conducted by the NEA dealing with access, adequacy, and equity of education technology in public schools and classrooms. In Roach's (2010) qualitative research dissertation on the implementation and use of technology in the classroom, the researcher found technology had a positive effect on student achievement, motivation and interest. The most recent national count

of computers in public schools, as reported by the U.S. Department of Education, shows a ratio of 3.8 to 1 for the number of students sharing an instructional computer with Internet access (Wells & Lewis, 2006).

In a nationwide survey that evaluates technology implementation at state education agencies, the Arkansas Department of Education ranked in the top 16 for Technology Counts 2009. This rating shows the state is making great strides in the areas of technology grade, use of technology, access to technology, and capacity of technology. State departments and school districts used this data to improve future implementation of technology (Edweek, 2009). The states were surveyed in the schools on educational technology nationwide in the areas of access to instructional technology, use of technology, and capacity to effectively use educational technology. The survey was conducted by the National Assessment of Educational Progress and EPE Research Center with support from the William and Flora Hewlett Foundation. The Foundation is a private company that gives grants to help improve education. National results are also provided as a benchmark to compare with other states. The grading scale of Arkansas Technology Counts 2009 reported the detailed scoring behind the grades for the areas of state policy (Edweek, 2009). Six other states scored a B-minus and nine other states scored a B or above, with West Virginia receiving the only A. The Arkansas Technology Counts memorandum is provided in Appendix B. This was a special state-focused report dealing with technology in all states – Technology Counts 2009 (Edweek, 2009).

The Hewlett Foundation Education Program (2010) states that William Redington Hewett, established the Hewlett Foundation in 1966 with his wife, Flora Lamson Hewlett, and their eldest son, Walter B. Hewlett. Hewlett believed in charitable giving and a lifetime of personal philanthropy. Grants were made in education, the arts, as well as environment, health,

and vital service to support the needy in the San Francisco Bay area. When Mrs. Hewlett passed away in 1977 the Foundation was renamed The William and Flora Hewlett Foundation. The foundation became a national philanthropic institution. In 1993, the Foundation's assets increased to more than $2 billion and annual grants rose from $35 million to $84 million in 1998. During that period, the Foundation focused on environmental grants on the Western United States and Canada, expanded its education funding to emphasize K-12 reform (The William and Flora Hewlett Foundation, 2010).

The Hewlett Foundation Education Program (2010) consists of three goals. These goals provide all students with access to rigorous, relevant, and innovative educational opportunities.

1) Deeper Learning - Increase economic opportunity and civic engagement by educating students to succeed in a changing world.
2) Open Educational Resources (OER) - Equalize access to knowledge for teachers and students around the globe.
3) California Education - Improve the conditions of education in California.

Professional Development

Policies and procedures from the state department should be revisited on a year-by-year basis for technology professional development because of the rapid changes in technology for schools and personal use (Nicholson, 2007). Slowinski (2003) emphasized, "As technology becomes more important, school administrators need to be aware of the relevant issues associated with effective integration of technology in schools" (p. 25). In-district trainings seem to work best when provided by the professional development department (Nicholson, 2007). Once administrators receive technology-based training, they will have effective skills to search a web site for quick and easy access to educational resources (Edudemic, 2012).

In order for professional development to be successful, Guskey and Huberman (1995) suggested finding the right combination that will work in a specific setting. They stated that "success, therefore, rests in finding the optimal mix of process elements and technologies that can be carefully, sensibly, and thoughtfully applied in a particular setting" (p. 126).

According to Brooks-Young (2002), "the key to having a successful technology program is in developing a school or district technology plan based upon input from stakeholders" (p. 13). Professional development is designed to help leaders acquire the skills needed to implement an education system aligned with technology standards. Principals should become familiar with software and hardware because of the rapid changes in innovations. Principals not being knowledgeable of infrastructure, budgeting, and planning can lead to inadequate or older technologies being obsolete and funding will not be effectively used. According to Brooks-Young (2002) the total cost of ownership should consider "professional development, support, connectivity, software, and replacements" (p. 98). Principals should also use multiple methods to evaluate technology resources for learning, communication, and productivity. Principals sometime overlook how they will evaluate the technology programs' effectiveness (Brooks-Young, 2002).

The school administrator is only taking technology professional development to fulfill state requirements (Yu & Durrington, 2006). One state department in the southeast initiates and supports professional development processes that produce effective uses of technology in teaching and learning. According to Ertmer et al. (2002) most professional development efforts have focused on the needs of teachers, with little attention paid to administrator needs.

It is the principal's responsibility to facilitate a mission and vision for the school.

Administrators have to think about how technology can impact the school, stakeholders, parents, students, and the community in implementing the vision (Henke, 2007). A school's capacity to change and to meet the dynamic needs of its stakeholders depends on decisions made by administrators. The principal's actions, interests, and priorities often determine whether or not a program of change succeeds (Redish, n.d.). Biemler (2007), director of IMPACT end user support, Chicago Public Schools, finds that principals ask for technology or technology training when they have a clear vision of a teacher who will use it (p. 4).

Principals also participated actively in professional development activities related to education technology and provided teachers with opportunities to learn how to use those resources (Culp et al., 2005; National Center for Education Statistics, 2006).

Gulbahar's (2007) study was conducted for the purpose of illustrating how the technology planning process was carried out in a private K-12 school in Turkey.

> Data were collected from 105 teachers, 25 administrative staff, and 376 students. There were unstructured interviews with the administrative staff and teachers to validate data obtained through questionnaires. Data were descriptively analyzed to provide necessary input for the technology planning process. The findings indicated that even teachers and administrators felt themselves competent in using Information and Communication Technology (ICT) available at the school; they reported a lack of guidelines that would lead them to successful integration. (p. 943–956)

In McKinley's (2014) dissertation, he stated that Banuglu (2011) studied the leadership skills of secondary education principals and their ability to coordinate technology integration throughout a school system. The findings show that principals, both male and female, have performed considerably well in technology leadership proficiency and positive perception of technology use in instruction. Banuglu stated that many principals perform at the expectation level of professional development trainers.

Technology Resources

While funding is an issue, teachers have more resources available through technology than ever before, but some have not received sufficient training in the effective use of technology to enhance learning (Staples, Pugach, & Himes, 2005). According to Staples et al. (2005) teachers need access to research, examples, and innovations as well as staff development to learn best practices. Some teachers do not have the same understanding of and the ease with using technology that is part of their workplace. The U.S. Department of Education is currently funding research studies to evaluate the effective use of technology for teaching and learning. School principals with a vision in technology, according to Nicholson (2007) do not just talk about technology; they use it in their professional and personal lives.

Daniel and Nance (2002) propose that school administrators should have some level of participation at all levels of the policy enterprise since it is they who will be ultimately responsible for the implementation and success of any school-related technology endeavor. Schools and universities were not responding in the recent years fast enough to the need to include technology in educational leadership programs (Dikkers, Hughes, & McLeod, 2005; Hughes et al., 2001). Professional preparation programs, including formal degree coursework as well as in-service seminars, need to develop the perspectives and skills necessary for this bottom-up reporting so that it can occur accurately with efficiency and with fidelity (Professional Development, 2011). For implementing technology in schools, the Technology Standards for School Administrators are indicators of effective leadership and can be used to guide the redesign and/or development of new graduate courses for school administration programs (Ertmer et al., 2002). Daniel and Nance (2002) examine the irony of state lawmakers and how they have not determined a role for administrators in educational technology. While creating

laws for the use of educational technology, lawmakers failed to define a role for the administration who must implement it. Meanwhile, administrators in their leadership roles are ultimately held responsible for the teaching and learning process that occurs in schools (Daniel & Nance, 2002, p. 211).

Ury's (2003) dissertation study was undertaken in the state of Missouri with the public school districts. This study was on the school principals' computer usage and conformity to technology standards. The purpose of Ury's study was to design a reliable and valid survey instrument that could be used to determine school principals' level of computer usage and performance related to the NETS-A. Surveys were used to collect the data from randomly selected K-12 principals in Missouri. The population in this study was 2,075 elementary, middle, and high school principals employed by 524 school districts. There were 345 surveys returned out of the randomly selected sample of 900 Missouri principals. Folz (1996) and Schwalbe (2002) established formulas for determining sample size. The goal of this study was to have 68 surveys returned for a 90% confidence level that the sample characterized the population. There were in fact 264 complete and valid surveys returned. The findings of the sample had a 94% confidence level of the population. Ury (2003) developed the Survey of Technology Standards for School Administrators (STSSA). The survey focused on computer skills in the area of technology integration. There was a need to integrate educational technology into the schools with the school principal's leadership. His results show that the STSSA can reliably measure public school principals' perceived use of computers and performance on the NETS-A standards. The results of this study provided information to school principals allowing them to examine how they and their peers have been performing to established technology

standards. The results informed colleges, universities, and in-service training programs of current weaknesses in programs that prepare school principals.

Technology use in education has become a national mandate through the No Child Left Behind Act (NCLB, 2013). No Child Left Behind section 2402 states the purposes and goals:

> To assist states and localities in the acquisitions, development, interconnection, implementation, improvement, and maintenance of an effective educational technology infrastructure in a manner that expands access to technology for students and teachers. To enhance the ongoing professional development of teachers, principals, and administrators by providing access to training and updated research in teaching and learning through electronic means. To promote initiatives that provide school teachers, principals, and administrators with the capacity to integrate technology effectively into curricula and instruction that are aligned with challenging State academic content and student academic achieving standards, through such means as high-quality professional' development programs. (U.S. Department of Education, 2003)

Lauer, Stoutemyer, & Van Buhler's (2005) study investigated McREL's Rural Technology Initiative (RTI), which is an online professional development intervention that provides opportunities for teacher collaboration while delivering training to teachers and administrators on instructional improvement. The purpose of the study was to evaluate the influences of the RTI on teacher instruction, teacher and administrator use of technology, and administrator practice. Whether professional development was delivered online or face-to-face, research suggested that support from school administrators was an important aspect of teacher professional development.

Dawson and Rakes's (2003) study investigated whether technology training influenced levels of technology integration in schools. A total of 398 K-12 principals participated in the study. The study used information from the School Technology and Readiness survey (STaR Chart Assessment CEO Forum 1999). The STaR Chart Assessment in 2006 was an online data collection survey instrument that many schools, as well as school districts, used to self-assess the progress they were making in integrating technology into the curriculum (p. 6). Dawson and

Rakes's (2003) study showed that principals who received training that focused on integrating technology into the curriculum lead schools with higher levels of technology integration than those principals receiving any other type of training. Further:

> the data showed that principals who received training that was customized to their needs lead schools with higher levels of integration than those principals receiving basic technology tools and applications training are those receiving basic technology tools and applications with Internet fundamentals training. (Dawson & Rakes, 2003, p. 42)

Accordingly, findings showed principals with more than 51 hours of technology training lead schools that are noticeably different from other schools and confirmed the belief that long term training is worth the effort and expense.

The Dallas Independent School District and the University of North Texas are in a partnership to create and set high standards for principal preparation programs. The partnership can recruit high-quality leaders. These schools are used as learning laboratories, conducting site-based projects and activities designed to lead school improvement (Hale & Moorman, 2003, p. 12). The seven qualities leaders must possess are:

- Motivate, encourage, and engage students with rigorous academic standards.
- Integrate curriculum with real-world activities.
- Establish a system of support that enables all students and motivate faculty to meet high expectations.
- Set goals for change that can be measured.
- Create a safe and nurturing school environment.
- Use research for best practices.
- Apply and integrate technology for management and instructional purposes (Hale & Moorman, 2003, p. 12).

A study conducted by Redish and Chan (2007) validated that educational leadership programs received a low average rating in preparing administrators as technology leaders. Their study found the weaknesses of the leadership program studied in Georgia included troubleshooting knowledge, allocating resources to implement technology programs, evaluating hardware and software, and identifying and monitoring progress of student technology skills.

Summary

Chapter Two reviewed recent research and the need for continuous studies of secondary administrator leadership in implementation of technology leadership. The lack of high quality research on school technology leadership reinforces the need for study. It provides a foundation for my phenomenological study grounded in school administrative technology leadership research. This research study may help inform and direct further studies in technology leadership and educational leadership programs. The literature describes how school administrators' technology leadership roles have changed since the inception of technology in schools. The findings are needed for professional development opportunities that engage administrators on how to lead technology within their schools. Chapter Three discusses the methodology used to investigate the school administrators' leadership role in technology.

Chapter Three:

Design and Methodology

Introduction

This chapter describes the focus of the study, research questions, research design, site and sample selection, Institutional Review Board (IRB), researcher role management, description of participants, data sources, and data analysis. This case study gave the researcher the opportunity to gather qualitative data in order to answer the research questions.

Focus of the Study

It is suggested that principals have a vision concerning the implementation of technology in order to become more effective instructional leaders (McLeod, Logan, & Allen, 2002). This vision must communicate the commitment of principals to the effective use of technology. The focus of this study was to investigate how high school principals' perceptions and attitudes enabled them to effectively organize, utilize, and implement technology. The purpose of this study was to investigate how high school principals' perceptions and attitudes enabled them to effectively organize, utilize, and implement technology. National standards such as the ISTE/NET-A are important for principal technology leadership in focusing on integrating instructional technology for changes in being knowledgeable and practicing effective technology tools.

Research Questions

1) What are principals' attitudes toward technology use?
2) How do principals describe their support of teachers in the use of technology?

Research Design

This research provides a detailed description, an analysis of the themes or issues, and the researcher's interpretations or assertions about the study. These interpretations may be called "lessons learned" (Guba & Lincoln, 1989). This study focused on the qualitative approach of principals' perceptions of technology implementation in high schools and their effects on leadership. The trustworthiness was based on the information received from the participants, persistent engagement, prolonged engagement, peer debriefing, member checks, triangulation, and an audit trail. The qualitative study consisted of interviews with 10 high school principals. A 16-item interview protocol using semi-structured questions was used. The interview protocol was divided into five sections: visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship. Visionary leadership included five questions addressing mission and vision of the school in implementing technology. Digital age learning culture included three questions addressing how technology has changed for the 21st century. Excellence in professional practice addressed two questions that involved curriculum integration in your school. Systemic improvement included two questions addressing the infrastructure and hiring in technology. And lastly, digital citizenship addressed four questions dealing with policies, procedures, legislation laws, professional development, and personal beliefs about technology. The researcher set up interviews with all participants by telephone and e-mail. The researcher visited with all participants personally to interview them.

Site and Sample Selection

The participants were administrators from Arkansas schools. There were two school districts selected and 10 high schools with grade levels 9 through 12. The school sizes ranged

from medium to large enrollments (see Table 3.1). A majority of the participants had been a high school principal for more than 10 years.

Researcher's Role Management

In qualitative studies, the researcher is the primary instrument for data analysis and data collection (Marshall & Rossman, 1999). As such, my role of researcher was to be that of interviewer. I used research questions and an observational protocol (see Appendix C) to take notes as the participant was being interviewed. I conducted one-on-one interviews with each high school building principal to acquire information about their experiences with technology implementation.

Institutional Review Board Approval and Gaining Entry

After receiving the approval of the dissertation committee, I submitted a request to the university's Institutional Review Board (IRB) requesting permission to conduct the study (see Appendix D). Upon obtaining a written approval from the two district superintendents, I collected work phone numbers, and work e-mail addresses for the 10, urban high school principals. I contacted the principals via telephone and e-mail and requested to interview them for the research. I asked each high school principal to schedule an interview in order to find out how their vision was developed in mission, planning, leadership support, and implementation concerning the technology in their buildings. I then sent my targeted participants the IRB informed consent requirements explaining that participation was voluntary but would be greatly appreciated. The ethics involved in this study manifested through the anonymity of participants, voluntary participation, the coding of the participants with letter and number for confidentiality, and no risk to participants. The informed consent form outlined their rights and responsibilities

as participants in this study. They were asked to sign the informed consent document before the interviews began (see Appendix E).

Participants

Participants in this study were 10 educational administrators at the secondary school level, specifically urban high school principals in Arkansas. These urban principals were purposefully selected because of their experience, diversity, and knowledge about the use of technology in high school settings dealing with the district and state policies. Purposeful sampling in selecting participants is common in qualitative studies. This was a strategy to choose small groups or individuals likely knowledgeable and informative about the phenomenon of interest and selection of cases without needing or desiring to generalize to all such cases (McMillan & Schumacher, 2001). The researcher selects particular elements from the population that will be representative or informative about the topic of interest. For example, in research on principal technology leadership, it may be most informative to observe expert principals rather than a sample of all vice principals and principals. Purposeful sampling provided rich information from participants that explained the phenomenon through the voice of those who knew it best. The participant demographics are located in Table 3.1.

Table 3.1

Summary of the Participants by Gender, Age (in years), Ethnicity, Campus Grades Served, Campus Size, and Free or Reduced Lunch.

Principal	Gender	Age	Ethnicity	Grades	School Size	F/RL%*
A.1	female	58	White	9-12	2,404	45%
B.2	female	45	African American	9-12	1,392	73%
C.3	female	59	African American	9-12	968	80%
D.4	male	46	African American	9-12	840	93%
E.5	male	57	African American	9-12	1,137	50%
F.6	male	50	African American	9-12	1,269	50%
G.7	female	40	African American	9-12	500	36%
H.8	male	50	White	9-12	965	49%
I.9	male	64	White	9-12	900	65%
J.10	male	62	White	9-12	941	40%

*F/RL% means free or reduced lunch percentage in each school

School 1 Principal A

Principal A has been in education for 19 years and served as an administrator for 12 years, including 8 years as a high school principal, 4 years as a middle school principal, and 7 years as a high school vice principal. Prior to her position as an administrator, she was an English teacher. Principal A has a bachelor's degree in English education and a master's degree in educational leadership.

School 1 is a school rich with history, academic excellence, and diversity. Over the years, the enrollment has been stable; the enrollment was 2,404 students in 2009-2010. In 2009-2010, roughly 45% of students were either free or reduced lunch. The school is on Title I and is in its first year of school improvement. The technology facilities include numerous computer labs with additional computers in every classroom, including an Environmental and Spatial Technology (EAST) lab.

School 2 Principal B

Principal B has been in education for 21 years. This principal has served as an administrator for 16 and a half years, which includes 14 years as a vice principal and 2 and a half years as a principal. Prior to her position as an administrator, she was a special education teacher. She has a bachelor's degree in education with an emphasis in special education and a master's degree in secondary school leadership.

Student enrollment for School 2 was 1,392 for 2009-2010. In 2009-2010, roughly 73% of students were either free or reduced lunch. The school is designated as a Title I school and is in its sixth year of school improvement. School 2 is an international baccalaureate school, the only one in this particular district, and one of only six in this state to offer such a high quality program of international education. The school includes the following technology facilities: business and industry, vocational training, and an EAST lab.

School 3 Principal C

Principal C has served as an administrator for 27 years, which includes 5 years as a vice principal and 22 years as a principal. She has been in education for 35 years. Prior to her position as an administrator, she was a business education teacher. She has a bachelor's degree in business education and a master's degree in vocational education. Principal C has worked in a suburban school district for over 20 years and has been in an urban district for the past 4 years.

School 3 became a magnet school in the fall of 2000. Magnet schools are free public elementary and secondary schools of choice that are operated by school districts or a consortium of districts. Magnet Schools of America (2013) stated that a magnet school has a focused theme and aligned curricula in Science, Technology, Engineering, and Mathematics (STEM), Fine and Performing Arts, International Baccalaureate, and Career and Technology. Students were

exposed to a comprehensive curriculum that focused on preparing students to meet the challenges of the future. School 3 has an enrollment of 968 students. In 2009-2010, roughly 80% of students were either free or reduced lunch. The school is in its sixth year of school improvement. The technology facilities include Information Science & Technology Systems Engineering, NovaNet lab, Compass lab, and an EAST lab.

School 4 Principal D

Principal D has served as an administrator for 11 years as a high school principal for only 1 year, middle school principal for 7 years, vice principal for 2 years, and curriculum coordinator/vice principal for 1 year. He has been in education for 21 years. Prior to his position as an administrator, he was a science teacher and has a bachelor's of science degree in zoology, a master's degree in secondary education, and a specialist degree in educational leadership.

School 4 has an enrollment of 840 students. In 2009-2010, roughly 93% of students were either free or reduced lunch. School 4 is a Title I school. The school is in its sixth year of school improvement and is using America's Choice School Reform as a school improvement initiative. The technology facilities include NovaNet lab, Compass lab, and an EAST lab.

School 5 Principal E

Principal E has served as an administrator for 28 years; currently, he is in his first year as a high school principal. Principal E has held several administrative positions, which includes 6 months as Assistant Director of Transportation, 24 years as a high school vice principal, 2 years as a junior high principal, and 2 years as a middle school vice principal. Principal E has been in education for 32 years. Prior to his position as an administrator, he was an adult education teacher, counselor, and administrator at the adult education center for 4 years. Principal E has a bachelor's degree in special education and elementary education, a master's degree in special

education with an emphasis in learning disabilities, certification in secondary administration, and a doctorate in student development and personnel services.

School 5 is the first and only complete interdistrict magnet high school with students from all three local districts. The magnet school embodies the belief that all students have interests and talents that families and educators believe are better cultivated in a magnet school. They often use a random computer-based lottery system for admission. Chen (2014) stated that magnet schools first came into being in the late 1960s and early 1970s as a tool to further academic desegregation in large urban school districts. Magnets were intended to attract students from across different school zones. To accomplish this, magnet schools had to do two things. First, they had to open their enrollment to students outside their traditional school zones. Second, they had to provide an environment or experience that would attract students and families from other school zones by encouraging enrollment rather than forcing enrollment. The hope was that families would voluntarily desegregate their children in lieu of being forcibly desegregated through bussing. School 5 has an enrollment of 1,137 students. Over the years, enrollment has been stable because students are able to use M-M (majority to minority) transfer into the school district. For example race enhances the desegregation, in three school districts where his/her race is in a majority to a school where there are not enough African Americans that race has a right to attend a predominately white school where he or she will then become a minority if space is available (Huntsville City Schools, 2014). In 2009-2010, approximately 50% of students were either free or reduced lunch. The technology facilities include an online distance learning lab, an EAST lab, and NovaNet lab.

School 6 Principal F

Fifteen years ago, Principal F became a high school administrator. He spent 10 years as a high school vice principal, 4 years as a junior high principal, and is currently in his first year as a high school principal. He has been in education for 25 years. Prior to his position as an administrator, he was a science teacher and has a bachelor's degree in biology, a master's degree in educational administration, and certification in secondary administration. Principal F is a candidate for a doctorate in educational administration and supervision.

School 6 is a university studies high school. Students have an opportunity to earn college credit. Its technology program consists of an EAST lab. School 6 has an enrollment of 1,269 students. In 2009-2010, approximately 50% of students were either free or reduced lunch.

School 7 Principal G

This principal has served as an administrator for 9 years; during 8 of those years she was a high school vice principal. Currently, she is in her first year as a high school principal, and she has been in education for 20 years. Prior to her position as an administrator, she was an English teacher and has a bachelor's degree in social science/political science, humanities-literature, a master's degree in secondary education in English, and a doctorate in educational administration and leadership.

School 7 has grades 9 through 12. It has an enrollment of 500 students. In 2009-2010, approximately 36% of students were either free or reduced lunch. The technology includes an EAST lab.

School 8 Principal H

Principal H has been in education for 25 years and has served as an administrator for 11 years. Principal H has served 3 years as an elementary school vice principal, 3 years as a middle

school principal, and is currently in his sixth year as a high school principal. Prior to his position as an administrator, he was an elementary physical education teacher and has a bachelor's degree in education, a master's degree in educational administration, and a specialist degree in education administration.

School 8 other programs consists of an EAST lab. School 8 has an enrollment of 830 students. In 2009-2010, approximately 49% of students were either free or reduced lunch.

School 9 Principal I

Principal I has been in education for 34 years. This principal has served as an administrator for 17 years, as a high school vice principal for 16 years and is currently in his first year as a high school principal. Prior to his position as an administrator, he was a physical education teacher and coach. Principal I has a bachelor's degree in physical education and a master's degree in educational administration.

School 9 has an enrollment of 941 students. Over the years the school enrollment has remained stable. In 2009-2010, approximately 65% of students were either free or reduced lunch. This school is on school improvement year 7. The technology includes an EAST lab.

School 10 Principal J

Principal J has been in education for 39 years and has served as an administrator for 19 of those years. Prior to his position as an administrator, he was a basketball coach and coached for 20 years. Principal J has a bachelor's degree in speech and drama and a master's of science degree in educational administration.

School 10 is in a predominately white community. The technology program consists of an EAST lab. School 10 has an enrollment of 900 students. In 2009-2010, approximately 40% of students were either free or reduced lunch.

Computer Labs at Participant Schools

There were various computer labs in the high schools for students to take credit recovery classes. Credit recovery is basically for students who have failed a course or a credit behind in their grade level.

Schools 1-10 have at least one lab dedicated to the use of computer technology. The interviewed principals mentioned the types of computer labs in their schools. Descriptions of the different computer labs are located in Table 3.2.

Table 3.2

Computer lab descriptions at the secondary schools

	COMPASS	EAST	ISSE	NovaNet	Online Distance
A.1		x			
B.2		x			
C.3	x	x	x	x	
D.4	x	x		x	
E.5		x			
F.6		x		x	x
G.7		x			
H.8		x			
I.9		x			
J.10		x			

Compass lab. Compass is a computer-based program where students are completing courses over the Internet for class credit. Students are completing courses such as English, math, science, social studies, and other core subjects in order to earn high school credit. These courses are self-paced.

Environmental and spatial technology lab. EAST began with one classroom in Greenbrier, Arkansas in 1996. The planning of lessons had to relate to real-life experiences being where it could be used with "disconnected" and "at risk" students. The EAST model is grounded in solid pedagogical theory related to the use of technology as a catalyst for learning, collaborative learning, and performance-based learning. The EAST model involves technology that promotes collaboration, higher order thinking, and problem solving. Technology is effectively integrated into the curriculum. Students independently select appropriate technology tools to obtain, analyze, synthesize and assimilate information. Home/school connections are enhanced through the use of technology. All students have adequate access to technology (EAST Initiative, 2010).

Information science & technology engineering (ISSE) lab. ISSE lab is one of three magnet programs in school 3. Student courses were hypertext markup language (HTML) programming. HTML is a language used to create electronic documents and information on the World Wide Web that contain hyperlinks to other pages.

NovaNet. It is a digital learning curriculum. It is a complete web-based system that delivers proven, rigorous, standards-based instruction for high school and adult learners. NovaNet is personalized and individualized instruction, a complete learning management system and core curriculum (Pearson Schools, 2013).

Online distance learning. Watson and Kalmon (2005) define online learning as "education in which content and instruction are delivered primarily over the Internet" (p. 127). Students are working from their home or classroom and using the World Wide Web.

Data Collection

Interview protocol. Before any interviews were conducted, all 10 principals were given an informed consent form that outlined their rights and responsibilities as participants in this study. They were asked to sign the informed consent document before the interviews began. Semi-structured interviews were conducted with each urban high school administrator on his or her campus in order to collect data for this study. According to Adams, McIlvian, and Lacy (1996), semi-structured interviews are often the sole data source for a qualitative research project and are usually scheduled in advance at a designated time and location. They are generally organized around a set of pre-determined open-ended questions, with other questions emerging from the dialogue between interviewer and interviewee. Usually the semi-structured interviews take from 40 to 90 minutes each. Drever (1995) stated that the semi-structured interview is great for educational research and enables the deep exploration of experiences. Data should also include observer descriptions. Each participant in the study was asked a set of questions about his or her background and personal experience utilizing technology. An interview protocol was used to guide the interview process. The interview protocol "helps the researcher organize thoughts on items such as headings, information about starting the interview, concluding ideas, information on ending the interview, and thanking the respondent" (Creswell, 1998, p. 126). The interview questions were based upon the Technology Standards for School Administrators/International Society for Technology in Education Performance Indicators and Technology Standards for School Administrator Collaborative and Standards for School Leaders from the Interstate School Leaders Licensure Consortium. The Technology Standards for School Administrators and ISTE/NETS interview questions that were asked, along with the standard which they address, are included in Table 3.3.

Table 3.3

Technology Standards for School Administrators/ISTE/NETS
Technology Standards for Administrators Interview

ISTE/NETS-A Standard	**Interview Questions**
Visionary Leadership	Explain your experience with technology when you were a classroom teacher and how it affected your educational career?
Visionary Leadership	How do you use technology in your day-to-to day operations?
Visionary Leadership	How do you demonstrate leadership in the advancement of technology? (Model)
Visionary Leadership	What is your mission and vision of technology in your building?
Visionary Leadership	How is technology funded at your school?
Digital Age Learning Culture	How has technology changed the operation of the school?
Digital Age Learning Culture	How do you support teachers in their efforts to use technology?
Digital Age Learning Culture	How many technology hours do you believe administrators should take in a year? Teachers?
Excellence in Professional Practice	How do you effectively use technology?
Excellence in Professional Practice	How are the teachers prepared to implement technology and describe how they integrate technology in the curriculum?
Systemic Improvement	When did your school start wiring for technology? How often is the technology evaluated for upgrades? Wireless building? Is there a school technology plan?
Systemic Improvement	When did your school start hiring technology personnel? Do you have a technology committee?
Digital Citizenship	How effective are your guidelines and policies for your students, teachers and administrators?
Digital Citizenship	Is social networking taught in your school? If so, explain. If not, explain.
Digital Citizenship	What are your personal beliefs about technology?
Digital Citizenship	What computer training do administrators receive in their professional training program?

At the beginning of each interview the participants were given the purpose of the study. The interview questions were presented one at a time, and discussed thoroughly. Each participant was told there was no right or wrong answers as they prepared to answer the

questions. Each interview lasted from 40 minutes to an hour and a half as the participants spoke on the subject.

Observational protocol. Marshall and Rossman (1995) stated that observation in qualitative research is the systematic description of events, behaviors, and artifacts in the social setting chosen for study (p. 79). I kept field notes during the interview process using an observational protocol as shown in Appendix E. When the researcher used an observational protocol, the essential process was recording information or, as Lofland and Lofland (1995) described it, "logging data" (p. 181). This process involved recording information through various forms such as observational field notes and interview write-ups. I observed the physical setting, particular events and activities, and participants' reactions during the observations (Bogdan & Biklin, 2003).

Data Analysis

Creswell (2008) saw the importance during an observation in a qualitative study. Descriptive field notes record a description of the events, activities, and people involved in the study, and descriptive field notes were used for the interviews in this project (see Appendix F). I chose to use field notes because they could enhance the interviews and paint a broader picture of the phenomenon. With the field notes, I was able to identify and write responses or abbreviate some of the data from the interview. I was able to note attitude and body language of participants as I had a first-hand encounter with their everyday environment. I could see facial expressions, hear intonations, and watch body movement. I used Creswell's observational protocol to conduct my observations and write my field notes. The observational protocol is a form designed by the researcher, before data collection, that is used for taking field notes during an observation (Creswell, 2008). I used reflective field notes to record my personal thoughts that

related to my insights, hunches, or broad ideas or themes that emerged as I gleaned a complete understanding of what was being shared through the interviewees' environments.

According to Strauss and Corbin (1990) coding is the process of examining the raw qualitative data when it is in the form of words, phrases, sentences, or paragraphs and assigning codes or labels. Strauss and Corbin identified open coding and axial coding. Open coding refers to labeled words and phrases found in the transcript or text. Axial coding is used to create themes or categories by grouping codes or labels given to words or phrases. Open coding forms initial categories of information about the phenomenon being studied by segmenting data from the interviews and observations. Each statement and/or word was separated into related code chunks or piles. Then, each of the code piles was assigned to a group that was categorized by the participant responses and the interview questions. For accuracy, coding was examined several times during the process to ensure consistency.

Trustworthiness

The trustworthiness was addressed by ensuring findings were based on reliable information from credible participants, prolonged and persistent engagement, triangulation, peer debriefing, member checks, and an audit trail.

Prolonged engagement. During repeated observation, I built trust with participants, found gatekeepers to allow access to people and sites, and established rapport so that participants were comfortable disclosing information. Being in the field over time solidifies evidence because researchers can check out the data and their hunches and compare interview data with observational data. Interviews were conducted over a six week time period from October 5 to November 22, 2011, and lasted from 40 to 90 minutes each.

Persistent engagement. The participants' perception of the implementation and knowledge of technology leadership in the digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship were considered in response to the interview questions. Negative case analysis was employed to ensure that there were no inconsistency within the data (Lincoln and Guba, 1985). All data found in this study has been reported. Lincoln and Guba (1985) stated that persistent engagement is to identify those characteristics and elements in the situation that are most relevant to the problem or issue being pursued and focusing on them in detail (p. 304).

Triangulation. Triangulation is cross-checking of data using multiple data sources or multiple data-collection procedures (Fraenkel & Wallen, 2003). Triangulation of multiple data sources was achieved through using interviews, observations, and my field notes.

Peer debriefing. Lincoln and Guba (1985) stated that peer debriefing is the review of the data and research process by someone who is familiar with the research or phenomenon being explored. Lincoln and Guba suggested that qualitative results be evaluated using the standard of "trustworthiness," as established by credibility and conformability. Peers helped with the instruments to confirm if the researcher was focused on grouping the sentences, words, and phrases. The peers served as critics. The researcher would communicate with peers through email, phone calls, or in person for feedback.

Member checks. Member checks were conducted with interview participants to verify the contents of interviews and to eliminate any misinterpretations. I asked each participant to review a document of their interviews and ask for any corrections. This provided confirmation of the data collected (Miles & Huberman, 1994).

Audit trail. Lincoln and Guba (1985) stated that an audit trail is established by researchers documenting the inquiry process through journaling and keeping a research log of all activities, developing a data collection chronology, and recording data analysis procedures clearly. An audit trail was maintained in order to further ensure the validity and confirm data of this study. A formal audit trail provides "clear documentation of all research decisions and activities" throughout the account or in the appendices (Creswell & Miller, 2000, p. 128). The audit trail should include all field notes and any other records kept of what the inquirer does, sees, hears, and thinks (Bogdan & Biklen, 2003). This trail will allow others to follow my process, step by step, to gain understanding of how I conducted this study.

Summary

Chapter Three focused on the methodology of the study to look at high school principals' mission and vision of technology in their schools and how technology changed over the years. It addressed the attitudes and perceptions surrounding the use of technology in the classroom and its implementation as an instructional tool. The participants were 10 principals from 10 schools within two school districts within the state of Arkansas. Interview questions were used to collect and analyze data. This study determined the extent to which public school principals participate and promote technology in their schools.

Chapter Four:

Presentation of the Data

Introduction

The purpose of this study was to investigate how high school principals' perceptions and attitudes enabled them to effectively organize, utilize, and implement technology. This qualitative study will also discover principals' attitudes toward technology use as well as whether administrators support teachers in their use of technology.

Audience

The main audience for this case study was principals, superintendents, technology directors, and policymakers. Principals are target audience members as the findings will inform their practice to allow enhancements and revisions surrounding their technology use and support and encouragement of staff technology use. Superintendents will benefit from the data found in this study as they will become informed leaders able to empower their current principals on technology use and support of staff technology use, as well as use the findings as best practices for newly hired principals' use of technology and support of staff technology use. Technology directors will find the data useful as they provide professional development on technology use for administrators and staff members. Policymakers can use the finding from this study to write policy to embed technology use by all stakeholders in the schools.

Interviews

The participants were allowed to select the environment for the interview to ensure the most comfort throughout the process. The interviews were conducted in an informal manner that fostered a relaxed exchange in conversation. The notes reflect the relaxed nature of the participants and the informal tone of the interview. The reader will notice various names of

technology trainings offered to participants. It was not deemed necessary to expound on those names as it would not add to the understanding of the trainings. An observation protocol (Creswell, 2008) was used to document reactions, emotions, nonverbal responses, and other body language of the school principals as the interviews were conducted.

Audit Trail

A list of notations for the audit trail is displayed in Table 4.1. Each school and participant was assigned an alpha-numeric code to ensure privacy and anonymity before any interviews were conducted so that no responses would be connected to a specific source.

Table 4.1

Notations for Audit Trail

Notation	Type	Participants	Codes
School 1	Interview	Principal	A.1
School 2	Interview	Principal	B.2
School 3	Interview	Principal	C.3
School 4	Interview	Principal	D.4
School 5	Interview	Principal	E.5
School 6	Interview	Principal	F.6
School 7	Interview	Principal	G.7
School 8	Interview	Principal	H.8
School 9	Interview	Principal	I.9
School 10	Interview	Principal	J.10

School 1 is identified as Principal A.1, School 2 as Principal B.2, School 3 as Principal C.3, School 4 as Principal D.4, School 5 as Principal E.5, School 6 as Principal F.6, School 7 as Principal G.7, School 8 as Principal H.8, School 9 as Principal I.9, and School 10 as Principal J.10. The letter represents the order in which the participants were interviewed. The number following the letter was randomly assigned and indicates number of participants in the study. Notes from interview participants are listed in Chapter Four and followed by alpha-numeric

codes. Both the letter and number following the word "principal" after each quote in the chapter will conceal the participants' identities.

Participants

This study consisted of 10 participants. The participants worked in two urban school districts where they led large high schools. As shown in Table 4.2, the participants were experienced educators with years in education ranging from 18 to 39. All served as vice principals before assuming the role of principal. All participants had at least a master's degree, with four having a specialist or doctorate degree.

Table 4.2

Participant Demographics

Demographic Information			
Codes	Years in Education	Highest Degree	School Principal/ Vice Principal
A.1	18 yrs.	Master's degree	12 yrs. - principal 11 yrs. - VP
B.2	21 yrs.	Master's degree	2 yrs. - principal 14 yrs.- VP
C.3	35 yrs.	Master's degree	22 yrs. - principal 5 yrs. - VP
D.4	21 yrs.	Specialist degree	8 yrs. - principal 3 yrs. - VP
E.5	32 yrs.	Doctoral degree	1 yr. as principal 24 yrs. - VP
F.6	25 yrs.	Master's degree	5 yrs. - principal 10 yrs. - VP
G.7	20 yrs.	Doctoral degree	1 yr. - principal 8 yrs. - VP
H.8	25 yrs.	Specialist degree	6 yrs. as principal 3 yrs. - VP
I.9	34 yrs.	Master's degree	1 yr. - principal 16 yrs. - VP
J.10	39 yrs.	Master's degree	19 years - principal 0 yrs. - VP

Note. N = 10 participants VP = vice principal

Axial Codes

The findings for this study were generated from interviews and observations. The notes were reviewed to search for common patterns. Open coding was used to recognize concepts in the phrases and words, and axial coding then linked the open codes. The five axial codes are listed below.

- Technology/Professional Development
- Principals
- Teachers
- Grants/Technology Coordinators
- Students

During the process of open coding, the data were read multiple times and grouped by phrases and words and open codes were written on different colored index cards. Axial codes or major themes emerged from the open codes. Axial codes linked the open codes by relationships, which eventually revealed themes.

Axial Codes of Open Code of High School Principals

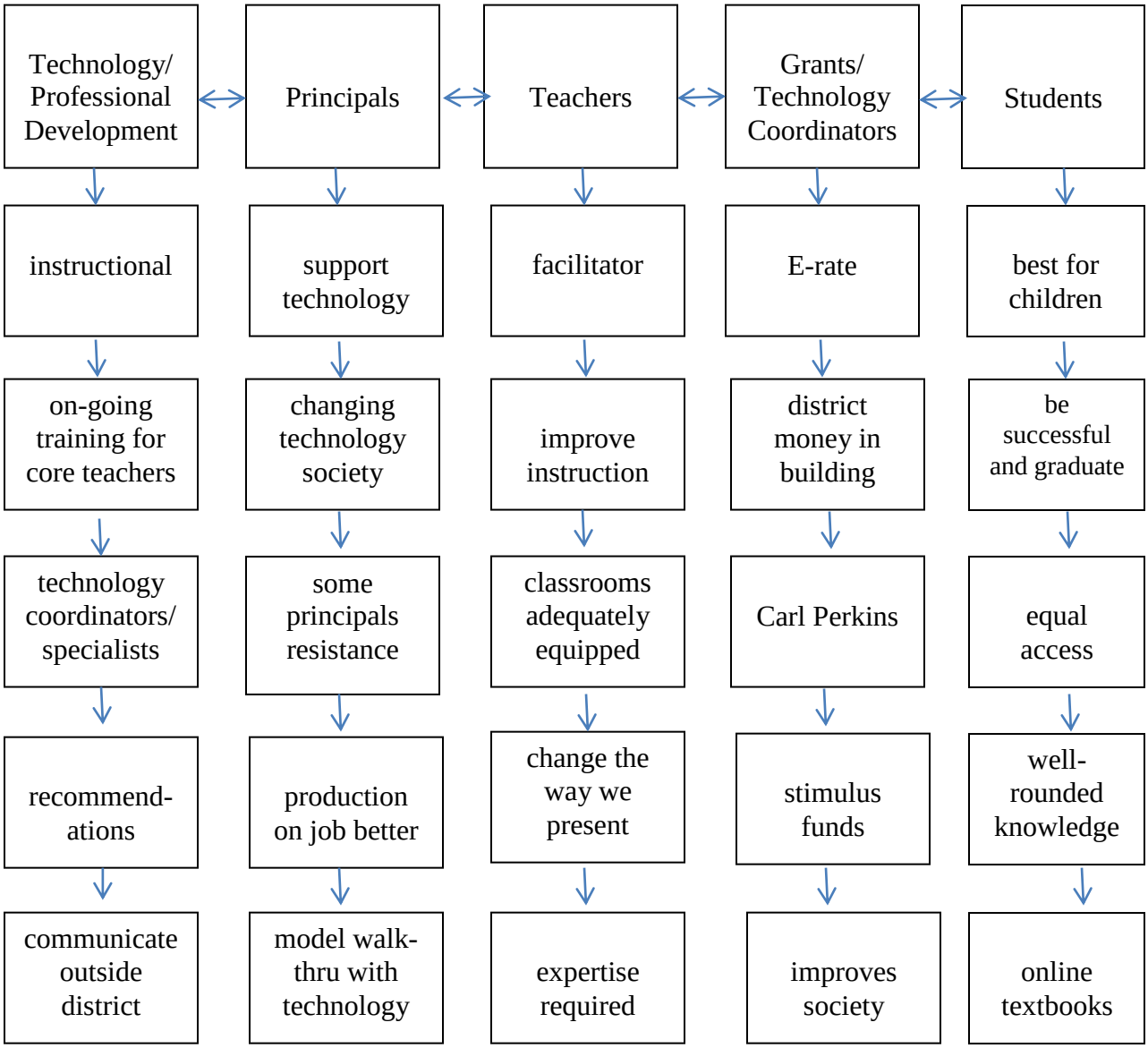

Figure 2. This figure represents a sample of open codes and five axial codes from the high school principals.

Technology/Professional Development

All principal participants believed that professional development in technology was extremely important in their buildings. They felt that principals should participate in technology professional development to stay informed and to lead their schools. Five of the principals discussed their need for professional development in technology.

One principal noted:

> Principals need to take more hours only if they do not understand how teachers are using technology for integration in the curriculum. The technology should be web-based and offered to the principals on a regular basis. Some administrators want to be tech-savvy. (Principal C.3)

Seven of the participants received an abundant number of hours (24-30) of professional development. The principals commented on the different computer training they received on Microsoft Windows and Dell computers in their professional development training program. The training was consistent with the software used for student data and instructional purposes. All principals had an iPad for walk-through, suggesting the need for additional training on mobile devices. Principal D.4 noted "administrators rotate through some training. Principals need to know how to evaluate in the classroom using technology and the teachers integrating technology."

One principal commented, "in evaluating teachers, I use an iPad for classroom walk-through," (Principal J.10). In education administration a "walk-through" is a formal observation but usually a brief visit for the evaluation of teaching while it is taking place in a classroom (Merriman-Webster, 2015).

As the researcher talked about professional development to the participants in the interviews several of the administrators felt that they should receive between six to 30 hours of technology in a year. A number of principals shared the typed of professional development they

had taken in the past years. Some of the participants felt like getting the required hours for professional development was not relevant to their interest.

One principal noted:

> I had Smartboard, Edline, Teaching Learning Institute, and HIVE which is a data system for tracking individual student scores for growth in End-of-Course Exam. The principal has to model walk-through with technology using an iPad. The principal is the key in the application in the building. (Principal A.1)

Another principal mentioned:

> I took training in E-School Plus, Purchase Orders, Discipline Training Pupil Equity Service, and attendance workshops and training on Average Yearly Planning. Actually, I get so many hours in professional development and at least one-third is in technology a year. (Principal H.8)

This principal commented:

> Oh my gosh, I have taken online evaluation systems, Teaching Learning Institute (TLI) this is a web-based data system. Most of the computer training is to gather data and use it with the staff-to show how the students' or schools' performance. One time I attended training on how to use administrative software but when I got ready to use it at work I had to call a business teacher to show me how to use it because I had forgotten. (Principal B.2)

All participant principals wanted their teachers in the building to check their e-mails, and professional development in technology would allow them to do that. While the principals felt they were receiving technology professional development hours, three of them thought teachers were not taking a vast amount of hours. Principal E.5 noted "I strongly encourage teachers to use technology." Two principals think that teachers do not take advantage of online professional development because they are only worried about getting required state recommended hours.

Seven of the principals believed six hours of technology for administrators and teachers were not enough because constant change in technology is inevitable.

> The training may warrant more attention and take additional training in that area because you were only in-service for 2 hours. The technology should be ongoing and continuous.

> We need to know how we are evaluating in the classroom using technology and the teachers integrating technology. (Principal D.4)

One principal commented:

> Administrators have to stay ahead. Example, some new computer software and we were only in serviced for 2 hours and it's like when I get ready to use it I had to call someone and had to have someone walk me through it. I have it all written down and I need help---it should be ongoing and continuous, much of it is too quick (laugh). Help! (Principal B.2)

Principals expressed the need to be kept ahead of technology with the digital age. Principal F.6 noted "state guidelines only require 6 hours. We do more than six hours of professional development. I have 30 hours of professional development in technology from last year." The principals see the changing digital world and are familiar with mobile apps and e-books. The participants felt they needed more training to keep up with the advancement of technology. Two principals talked about getting rid of textbooks in their schools and using e-books for students. One principal indicated phones were also educational if used in the classroom.

Summary of Technology/Professional Development

Receiving professional development in technology was important to principals. Principals believed it was important for them to participate in professional development in technology in order to lead in their schools. The majority of the principals had completed a large number of computer training and felt they needed to stay abreast of technology. In general, all principals wanted their teachers to know the basics of technology. Some principals encouraged their teachers to take more technology professional development for communication purposes and to stay abreast of technological changes. All principals were aware of the need to stay ahead of the digital age of technology.

Principals

These principals of the information age wanted teachers to be more helpful and effective in technology so students could get the technology instruction they needed in the 21st century. Principal G.7 noted "that I have used an ELMO in some presentations. I lead by example and some administrators are still resistant to technology. A lot of people are resistance and will not check e-mail. We can cut down on meetings and embrace it and utilize time better." Principal B.2 noted "a lot of teachers are still stuck in the same way; some teachers do not want to change; some teachers feel intimidated." One principal uses technology in all his faculty meetings to encourage teachers to integrate and implement technology in the classroom. One principal stated he wanted his vice principals and staff to become paperless by using e-mail to communicate, send lesson plans, and share resources. The teacher lesson plans are e-mailed by computer to administrators. Some teachers and principals were resistance to change and technology was intimidating. Principal I.9 commented "I don't have time to really use the computer at work." One principal noted:

> I present technology to administrators and faculty by streaming videos in professional staff meetings, also displaying data developed with PowerPoint using charts, how the school is performing district and state wide, and encourage administrators and academic coaches to use technology. (Principal D.4)

Another principal noted:

> One principal commented that one of his veteran assistant principals still is not as tech-savvy as others but will use an iPad for taking pictures of his grandchildren. But the assistant principal is now starting to embrace the technology and use it more often at work. (Principal H.8)

The participants in this study felt their schools needed to have technology infused in all forms of instruction. One of the participants said they demonstrated to teachers how to use specific technology at a faculty meeting. Principal G.7 noted "in faculty meetings, I use

technology in presentations to demonstrate PowerPoint skills and YouTube." Three principals indicated they were purchasing Kindles for the teachers for the next school term.

Computers on Wheels (COWS) were used for teachers to check out and for student use in the classroom. This equipment was used by teachers during their trainings. Principal E.5 noted "teachers are provided in-service for technology at the school building level. Teachers from career and technical education department and the librarian are trained to present in-service." The principals believed teachers would have reason to infuse technology in their lesson plans and thus increase student achievement. They tried to set an example with their use of technology. Principal H.8 stated, "I cannot operate without it. Using a technology device gives us an opportunity to communicate over the internet." Principal G.7 noted, "the Palm Digital Assistance (PDA) is used for walk-through when they are functional. Sometimes it is easier to use pencils and paper."

Being able to collaborate, network and share information all over the world is important in the education scene. Here are some of the principal comments:

One principal has two palm digital assistants (PDA); he carries one in his pocket at all times and leaves the other at work. Principal D.4 noted "I could not function without it. I use Palms to plan my day. I actually have two of them. I carry one PDA around in my pocket at all times."

Several principals use technology after leaving work. The two school districts were instrumental in providing iPads to all principals and some vice principals.

Two principals use technology to stream videos during faculty meetings or other administrative meetings and display data developed from PowerPoint or charts on how the

school is performing. One principal commented on other technology that he used regularly in his building:

> Okay, I text on my cell phone, my schedule is kept electronically, and I use the PLASCO machine which is used for electronic tardy passes for tardy students. Also I have the electronic box voice mail on my computer for the telephone. (Principal E.5)

This administrator talked about texting to teachers that had not shown up for a faculty meeting or were running late for school. This technique demonstrates to the teachers that the participant knows how to use texting in a professional manner.

All principals had a mission and vision for their technology leadership. One principal's vision was to have the most up-to-date technology available for teachers in the building. Several of the principals discussed demonstration of leadership in the advancement of technology and focused on becoming familiar with how to use it in administration. A majority of the principals used iPads for classroom walk-throughs; these iPads were used to evaluate the impact of the technology mission and vision on day-to-day operations of the school. One principal commented on how technology changed the operation of the school. This principal's vision was to use more technology and less paper to communicate. Principal E.5 noted that, "I strongly encourage teachers to use technology."

Another principal noted:

> Moved the school in ways where teachers use computer technology for Grade Quick-Edline, progress to Parent Link is the call out system for attendance, announcements through e-mail. Teachers use it for research and subjects. Administrators use it for discipline attendance and to contact parents. Telephone and voicemail alerts, accounting software for bookkeeper. Technology has changed tremendously. Most can be accessed from home. (Principal C.3)

Another principal noted:

> Some of the classes have virtual fieldtrips via distance learning. The teachers have the students meet in the library where the equipment is setup for the instructional learning. We expose students to mathematics classes, science projects, and research papers. It

> prepares them better for college. The students are amazed at the technology. (Principal H.8)

One principal commented, "the mission and vision of technology is to provide adequate professional development where [making teachers feel comfortable with technology] is not quite as simple as it seems," (Principal D.4). This principal's vision is to prepare students for future employment. Principal E.5 noted "that the mission is to prepare administrators, teachers, and students for everyday changing of technological society and advances and to keep them well informed." The principal plans to purchase iPads for all assistant principals, literacy coaches, and a math coach.

A principal shared:

> The teachers have LCD projectors, Smartboards, and whiteboards. Teachers use the internet to pull information off. All core teachers should have at least 5 computers in their room for teaching. No online courses. The art classes have digital imaging and graphic designs. The students love the class. (Principal B.2)

Five of the principals commented on their personal beliefs about technology. They believed technology was ubiquitous, ever changing and worth learning. Principal F.6 noted that "it is the wave of the digital age." One principal noted, "I think technology is inescapable and necessary. (Principal G.7).

Another principal noted, "technology is only as good as the level of proper usage and implementation. If one feels comfortable with technology they will use it. All teachers after using some level of technology should be able to deliver instruction" (Principal D.4).

Another principal stated:

> Technology is the way of life and people should be well versed in the use of computers to survive. It has helped society and the economy to do things more efficiently and accurately. The administrators use basic knowledge in order to be effective. We also use it for research to use for various projects as it relates to school improvement. (Principal C.3)

Another principal explained:

> It is necessary for technology with the information highway; everything is technology basically (laugh). I think we rely on technology too much (laugh). I get paralyzed when it is down too much. It is a way of life. It improves society. It makes production on the job better. (Principal B.2)

Another principal stated:

> My 11-year-old granddaughter saying how fun I am imagining what technology is like now at your age and just really imagining what it will be like at my school and age later in the future. As this historical school focuses on high academics we need to be on the cutting edge of technology. (Principal A.1)

In order for the mission and vision to succeed, all principal participants wanted their buildings to go wireless. Five of the participants' school buildings were in the process of becoming wireless at the time of this study. Four of the buildings were wireless in certain receptive areas *(hot spots)* in the building. Only one building was fully-wireless, and it was funded by a business partnership.

Summary of Principals

The attitudes of school principals dealing with new technologies in professional development will persuade, promote, and support teachers as they engage in new learning opportunities. The principals are the ones that set the tone by using technology in presentations, and, daily work. If the leader of the building has a mission and vision and is using technology, it will encourage teachers to make a change and embrace it. The principals should attend technology in-service sessions with teachers in their building. The principals are able to collaborate with other administrators on their technology reports and data.

Teachers

Participants wanted to help all teachers feel comfortable with technology use in the classroom. Principal B.2 noted "I purchased the software and the students used the old

computers. Each teacher is given an opportunity to design their own webpage at the end of the school year (phone call interruption). Some teachers facilitate the technology in meetings." One principal noted "the choir room has electronic piano labs that record, monitor and printout of student compositions. All teachers have Smartboards, ELMOS, and LCD projectors." (Principal E.5)

Another principal shared:

> I try to support teachers with whatever technology they ask for upon request. I would like to move away from textbooks and use iPads or Kindles. All teachers have access to ELMOS. All science and math classes have a lot more demonstration with technology. Clickers are popular in the classroom. Attendance is checked by teachers. The school is also reviewing a new attendance program through e-mail. (Principal H.8)

All the principals supported the effective use of technology and their teachers. The principals explained the effective use of technology as using it across all facets of teaching and learning. In order to support the effective use of technology, the principals stated that they provided equipment, software, and hardware for the classrooms. For example, Principal A.1 noted "the teachers have access to Interwrite pads and Dell computers." The principal participants in this study wanted to ensure their schools were technologically sound.

While the principal participants wanted their teachers to use the technology in their instruction, they felt the teachers must remain within guidelines created by the state. The internet guidelines are aligned with the state, school districts, and school policies and procedures dealing with the information highway. Principal G.7 noted "Internet contract and monitoring is efficient. The district has blockers on computers when we run into issues where they integrate curriculum." The participants also felt other technology equipment, such as cell phones and iPads, could be used with strict guidance from teachers to ensure appropriate application and student safety. Principal A.1 noted "there are a lot of cell phone issues." Seven of the

participants stated that they fell within the guidelines. "I am an e-mail type of guy. I am not a strong advocate of Twitter, Blog, or Facebook. There's so much of non-factual information on Facebook. I don't use Facebook." (Principal D.4)

One principal commented:

> If the rules are followed guidelines are more than sufficient and computers labs are equipped with LanSchool. LanSchool is software that shows and monitors the teacher's screen on the monitor and security measure, allow or block specified applications on computer monitors. (Principal C.3)

The principals commented on social networking in the schools. This was a hot topic for some principals; they expressed negative attitudes toward social networking because it brought on unnecessary conflict among students. However, other principals thought that social networking has a place in the classroom. Principal F.6 noted "I think nothing of it." Some teachers create Blogs. Five of the principals had a concern with social networking and how it fit into the curriculum, as well as how it keeps students safe.

One principal noted:

> From the administrator perspective it can be a problem; and a lot of discipline issues. Several teachers are on Facebook with levels of Facebook security and it can be positive. Teachers can see a change in students' attitudes and it can be positive or negative. (Principal G.7)

Another principal noted:

> No, social networking does not have a place in the curriculum. It can be disrupting to the learning environment. Fights occur because of those networks. People will write or say anything. I would outlaw cell phones and social networking, however, iPods, iPhones, laptops, and iPads are okay and headphones would be mandatory. (Principal E.5)

The principal noted:

> Social networking I think (laugh) it can consume your life (laugh). It's a way of writing and speaking. It is a breakdown of formal English language. I don't want a Facebook account, all my friends have one; usually I use my husband or one of my sons and one time I used it and I got stuck there for three hours. Also it can be dangerous; it can be used to demean people. If students used it the right way I think that it can be taught how

> to be used properly. Some principals have Facebook accounts. Teach the concepts of social networking. (Principal B.2)

The majority of principals felt a level of hesitation about social networking.

Summary of Teachers

Some teachers like to utilize new technology tools and incorporate new ways of integrating technology into the curriculum. Some teachers used Facebook for project-based assignments or homework. The students can learn how to use software in an academic setting and be held accountable for their actions. Teachers are encouraged by the principals to share lessons by e-mail or Web-pages that have been set up. Teachers should be able to choose the technology professional development that interests them along with what is best for the academic setting.

Grants/Technology Coordinators

Six of the principals stated they had stimulus money to use on technology. Four of the principals indicated they had funds from school improvement grants because their school was on the state school improvement list for low student achievement on standardized tests. Some principals felt they needed more money to enhance their technology capabilities in the building. Others felt the money they received would enhance their capabilities over the next few years. One principal actually shared his state budget at their school: $319,735.00 for that year for technology equipment or in-service. Carl Perkins funds are in all 10 schools for career and technical education classes and technology equipment, software, upgrades, and in-service. “The Carl Perkins funds are tied to literacy and math in the advancement of student achievement, one of the principals indicated in the discussion” (Principal C.3). The criteria for the Carl D. Perkins Vocational and Technical Education Act links the program of study with the academic and vocational content across secondary education and will ensure program improvement. Carl

Perkins funds support the programs that include academic skills, technical skills, employment opportunities in blue collar jobs, or post-secondary education. Two schools indicated funds were through the ACSIP Plan. Arkansas Comprehensive School Improvement Plan is a framework for a comprehensive, highly structured specific and focused action plan that addresses primarily the affective use of the school's implementation of goals, instructional programs, and strategies to meet student's needs. The ACSIP model is an annual planning and fund distribution design that must be used by all Arkansas and public schools, as defined by Ark. Code Ann.6-15-419. One principal commented:

> Carl D. Perkins is federal money set aside specifically for students in career & technical education for teacher instruction and professional development as well as equipment. It is tied to literacy and math in the advancement of student achievement. [There is a] Small amount of money through district allocation. The principal has technology budget used for replacement, maintaining and replacing older equipment, and purchases such as scantronics and district radios. (Principal C.3)

Technology is funded from various levels in order to provide the money for software and hardware at the schools. Some schools have partnerships with local businesses that fund technology improvements while other schools use local grants to offset costs. All schools do not have the same funding opportunities because some of the schools are technology magnet schools. Principal B.2 noted "space and finances are a problem."

Several schools were on school improvement and had additional funds to spend on technology. The School improvement grants are used to purchase technology equipment, furniture, software, books, and any other instructional information.

Also, several schools were on Title 1 and had the extra funds provided to low income schools. At least three schools were Title 1 and in school improvement, so all schools did not have the same technology or funds to spend on instructional programs or equipment. Four of the

principals were upset the funding opportunities were unequal; however, six felt that while funding was unequal, they had to work within their budget to provide the technology.

Five of the schools have a building technology specialist or coordinator to train teachers and administrators and present in-service building-wide on how to use technology in the classroom. Five principals indicated they have a school technology specialist, but only two principals said they have a technology committee. One principal noted, "no technology coordinator and no technology committee. It would be easier to have a technology specialist in the building instead of just depending always on the district director for technology information and maintenance." (Principal F.6)

Another principal stated:

> Arkansas School Comprehensive Improvement Plan (ASCIP) determines more the technology and meeting with the leadership team. I'll try to secure funding. Strong suggestions from central office and information technology. Any technology plan in the school has to be approved from central office. The number of hoops you have to go through in order to get approval. (Principal G.7)

The district technology departments decide on the technology evaluation of upgrades and when buildings should be wireless. Once the decisions have been made, the process begins in hiring a qualified person for the job to handle the logistics. All the principals indicated that a technology coordinator or technology specialist would be beneficial in the building. One principal commented, "this school has been wired since 1992 structure of the building. It used to have one computer business lab with one teacher. As we upgrade, we had to hire more computer teachers." (Principal C.3)

Several of the principals indicated that the mid-1990s was when they hired a technology coordinator or technology specialist in the school building. Six of the 10 schools have a

technology committee. Two of the principals talked about the school hiring personnel for technology.

One principal noted:

> We have been hiring technology personnel for over 20 years in this building like a technology coordinator. The technology coordinator fills work orders such as telephone repairs, contact person, and keep up with inventory. The technology coordinator no longer does any repairs because the technology department for the district repair and most work is done in-house. District personnel are assigned to the building. NovaNet Site Instructor hired in 2006 school year and Nova Net is funded by Enhancing Education Through Technology (EETT) that supports teaching and learning through technology. (Principal C.3)

NovaNet is a credit recovery program that offers computer-assisted instruction in subject areas such as English, Math, and Science. This program allows students who have failed courses previously to retake courses online. NovaNet and EETT are a part of the No Child Left Behind Act (NCLB).

The principal mentioned:

> There is a leadership committee which consists of one department chair from career and technical education and one vice principal that gather information concerning technology needs from teacher departments. There are always at least four career and technical teachers willing to give technology in-service and give advice and make recommendations. (Principal B.2)

In one district at least five principals had access to a technology specialist or technology coordinator that could train, manipulate, and demonstrate the technology. Also most principals had access to business teachers in the career and technical education department; it is their other source of technology expertise in the school. Three principals indicated they have had a technology committee that decides what computers and software are needed. The two districts have a technology director who also decides what technology will go into certain school buildings.

Open communication is the key to purchasing technology in the district. The principal participants stated that technology directors decide what technology software and hardware are used by the schools. They felt that most of the time administrators did not know what software and hardware they were getting because it was just ordered and sent to the school, sometimes with no training in advance.

Summary of Grants/Technology Coordinators

Funds were most important in purchasing updated software and hardware. Each district had money but it was unequal in each building. Technology coordinators were needed in all schools to help with the technology mission and vision of the school. The role of the technology coordinator along with the principal would help with the infrastructure, updates, curriculum integration, and technology professional development. Technology committees should be formed in all schools for the best interest of the students.

Students

The principal participants described the digital divide as a split between students who were being raised in a technology driven society and the technology-challenged teachers who teach them. Three principals said that students need to be college ready. They felt being college ready includes giving students the opportunity to learn about technology from teachers who have been taught how to use and teach with computers, iPads, the Internet, and other forms of technology. Principal H.8 noted "all students are college ready and all students entering colleges will have to be computer literate." Several of the principals know that iPads are very popular among adults and students. A couple of the principals talked about smart phones, mobile phone applications, and e-readers, for reading books and calculating math problems. One principal talked about teaching students to apply content into using YouTube. The principal participants

wanted more training and teaching opportunities for their teachers to help them narrow the divide.

One of the principal's vision included exposing students to learning outside the school walls without having to leave the building. Principal E.5 noted "that there is a $40,000 distance learning lab set in one small auditorium that holds 100 students."

Another principal shared:

> Technology is a wonderful invention that has surfaced and it changes so much and move so fast and at times find it hard to catch up. It sometime becomes obsolete. The marketplace is with students and you can find a job in the area, students will be well-equipped and experienced. (Principal C.3)

Social media for students is very popular but a lot of issues comes from not being able to use it in some of the schools. Most schools had social media blocked, and the students used their cell phones to access it during the school hours. There should be educational in-services for teachers to learn the proper way to use these platforms. The teacher is able to integrate the social media into the curriculum and the student learns first-hand how to use the program without any penalties. Social media plays a big role in our society today. Social media can lead to students sharing misinformation, downloading websites that have been blocked, and videoing at inopportune times. If students are taught social media skills in schools by a trained professional they would have some knowledge of the dos and don'ts. Most of the administrators did not agree with social media being taught in the curriculum. Social media and Facebook lesson plans can be based on creativity, critical thinking skills, problem-solving skills, and collaboratively learning and participating. There can be a place for social networking in the school curriculum if it is planned out. That is also why technology coordinators would be hired to work on the integration of technology for the teachers/students.

Online classes would be a plus for students who are behind in credits or would like to graduate from high school early. Online classes are only available in NovaNet labs for students who need credit recovery. They are only able to access the course from school.

Some teachers are implementing Wiki into the class lesson plans for students to create a school newspaper. Wikis can be used for communication purposes, videos, and e-portfolios. Wiki is a web page where you can create and upload various items. Wiki is a popular tool in the schools and used by students and teachers.

Summary of Students

Technology for students is a necessity in the home, school, office, and society. Students are able to download their data assessment results from the computer. Technology is a chance for students to learn and gain skills that will benefit them in their careers and in their jobs. The teacher uses strategies for the computer skills in all subject areas to give a better chance for all students to succeed in the digital age. Students are able to take web-based classes, marketing classes, career life skills, and business classes that will help them in the future.

Summary of the Findings

Their interviews revealed that most principals were comfortable with using and implementing technology. The observations revealed that most of the principals were comfortable in their level of expertise in technology, and three principals were able to share stories of teachers with success in technology. One principal was able to address problems that arose with the uses of technology in administrative and classroom use. Eight of the 10 principals were able to demonstrate support and leadership of technology professional development use. Three of the principals understood the implications of planning, infrastructure, and budgeting of technology. The principals were at ease in the interview session; one principal was eating cake,

one principal had several telephone interruptions, and at least two laughed constantly while talking about technology. One principal laughed at certain questions about how it affected her educational career indicating that technology has changed so much in the last 30 years. One principal was multitasking and asked if I minded if she signed certificates for student incentives and took several phone calls while being interviewed.

Summary

Chapter Four presented the findings discovered by the case study. The five axial codes were: (a) technology/professional development; (b) principals; (c) teachers; (d) grants/technology coordinators; and (e) students. The study focused on the two research questions of the methodology and design of the qualitative case study. The data came from the participants' interviews and their experiences. Data was provided for the 10 interview participants. Open coding was used to produce the patterns and themes that were analyzed with the triangulation of categories. The principals believe that technology needed to be implemented in the curriculum for the students and the ever changing technological society.

Chapter Five:

Conclusions and Recommendations

Introduction

Chapter Five will include the introduction, grounded theory, theory one, theory two, theory three, summary of findings, research question one, research question two, recommendations for the field, recommendations for further research and the conclusion. This study explored the attitudes and perceptions related to how high school administrators supported their technology mission and vision by investigating how they organized, planned, and implemented technology. There is a plethora of research suggesting advancement in the use of technology for teachers and students (Thacker, 2007), but research pertaining to the perceptions of administrators has been lacking. NETS, ISTE, and ISLLC/ELCC have provided leadership in this field to create technology standards for administrators, teachers, and students. Furthermore, because administrators are leaders of the educational system, it is important to look at their knowledge bases and uses of technology as their perceptions and usage are indicative of their vision, organization, and planning.

Grounded Theory

Data were collected through face-to-face interviews with notes and observation. Through analysis of data, the following five axial codes, or major themes, were established: (a) technology/professional development, (b) principals, (c) teachers, (d) students, and (e) grants/technology coordinators. These five themes emerged from the data into three selective codes related to the coding for high school principals: (a) leadership, (b) information opportunities, and (c) community. Selective coding is the process of integrating and refining the theory and involves refining the axial code paradigm and presenting it as a model or theory

(Strauss & Corbin, 1998) through such techniques as writing out the story line that interconnects the categories and sorting through personal memos about theoretical ideas. The themes and categories created the support that answered the research questions. In this grounded theory, the researcher took notes to record their insights and impressions; this was referred to as audit trail (Lincoln & Guba, 1985; Corbin & Strauss, 2012; Patton, 2014).

Theory One – Leadership

This analysis consists of themes that emerged from the data. The first selective code to emerge in the study was leadership. Leadership was supported by three open codes: (a) principals, (b) professional development, and (c) technology coordinators. Principals are instructional leaders as well as administrator in the school building. As such, their attitude determines the mood of the faculty, staff, and students. It can persuade teachers to embed technology use in their lesson planning and promote technology use among students through electronic interactions. As the leader of the building, the principal can foster a culture of technology use among teachers and students that supports aggressive use of technology within and between school, community, and home by way of presentations, evaluations of programs, and teaching.

For example, one participant talked about the various technology training they engaged in throughout the year:

> I am proficient in Excel, create spreadsheets, completion of reports by central office, and use the Internet for various activities. There is other software where I had training such as Inspirion, Kid Spirion, and United Streaming. We do more than the required six hours. (Principal G.7)

One principal talked about how he used his PDA (palm digital assistant) all the time for walk-through and shared:

> The district encourages me to use it and information is sent and synced to me using this device. So when I get back to the office all I have to do is print the information for viewing. (Principal D.4)

If leaders have a clear mission and vision for technology use, they can encourage change among their faculty, paint a technology-use roadmap for reluctant users, and demonstrate that change in the direction of modern technology is good, warranted, and doable. The leader has to support technology in order for it to be successful in the building. Their leadership can reinvigorate those who want to change and can support and guide change for those who are skeptical. The principal has to understand the role of technology in the digital age, as well as its dangers and benefits.

Sound leaders continue to learn and grow through technology implementation by attending professional development with their staff to ensure consistent understanding. Attending in-service with their teachers demonstrates a oneness with regards to technology implementation. Teachers can see the level of commitment from their leaders and perhaps be more willing to give a commitment to use technology.

Theory Two – Information Opportunities

The second theme to emerge in the study was information opportunities. Information opportunities was based on the following: (a) technology, (b) grants, and (c) teachers. Instructional and ongoing professional development training is vital in this age of technology. It is important that the community know what is going on inside the schools to help with modifying the educational wants and needs of performing at the highest caliber. The teachers learn various strategies of teaching methods and stay updated with the integration of technology.

For example, one principal noted, teachers feel comfortable enough to teach. All teachers should have some level of technology to deliver instruction. (Principal D.4)

Funds were an issue for purchasing computer software and hardware. One noted:

> The PTA helps fund with the Parent Teacher Association grant and stimulus funds. The school received a grant from Verizon Wireless. We do not receive Title I funds. [With] The PTA funds we purchase ELMOS and clickers for the instructional classrooms. (Principal A.1)

In today's society, technology is a must to communicate, stay relevant, and to stay abreast of the careers by researching what is available in order to become important to the workforce. With social media emerging as a key communication vehicle for students, there is a need for a committee to review various platforms that will serve the purpose of educating our children on the ways of using social programs that might affect them for the rest of their lives. Securing grants can help ensure infrastructure for computer systems, but also allow the development of a sustainable committee to maintain watch and recommend policies for safe technology use.

Theory Three – Community

The third theme to emerge in the study was community. Community was supported by the following: (a) students and (b) parents. Students and teachers interact using various technology tools in the classroom, but their interaction can expand to the parents and the community. Interaction with technology must expand beyond school walls to foster communication among all stakeholders. The students need equal access in school and at home working with technology. We want our students to be successful, well-rounded, and able to graduate from high school. Access to technology outside of school can help our students connect and communicate with the community around them. Principal A.1 noted, "easily accessible for all parents and keep the lines of communication open. Every person should have equal access so he/she can be the best for all children."

Another principal stated:

> Social networking is time-consuming and I am not interested in Facebook. Facebook is blocked at our school. Cell phones and telephones have rules in the schools. No social networking in this school. Social networking should be taught how to use properly. Social networking is used in college. (Principal C.3)

Parents need to be more involved in the education of their children. Email or Facebook can help them accomplish that task. Parents need to know how to log onto computers to see how students are using their academics and read the newsletters and other information that is sent only via e-mail. Schools can provide professional development training designed for parental involvement. The professional development will encourage participation in the school. Social media is ideal for linking the community and stakeholders on student assessments, student achievement, and fundraisers.

The community can stay abreast of activities and academic performance of the local school through various social media and electronic bulletins. The community can also assist teachers and students with technology needs and communication through partnerships.

Summary of Findings

This study sought to explore the attitude of principals toward technology and their support of teachers and teachers' use of technology. The goal was to determine whether principals actually support, promote, and encourage technology use in their buildings and whether they modeled technology use to foster teacher technology use throughout the curriculum. This study helped determine how administrators can facilitate the integration of technology in the classroom.

Three theories emerged from the data which provide insight on how principals are implementing technology in an instructional environment to communicate with teachers and students: (a) leadership, (b) information opportunities, and (c) community. These theories were

supported by axial codes and open codes. Collected data were triangulated using interviews, observations, and field notes. Research associated to the two research questions for this study was limited.

Research Question One

Research Question 1 was: What are principals' attitudes toward technology use? This study showed that while some principals were confident with their abilities to implement the mission and vision for technology in their schools, others were not so knowledgeable about their roles. They believed that a variety of factors hindered their implementation, from the lack of proper professional development to the lack of funding for instructional materials, software, and hardware. Also, a lack of time management for learning the technology practices was a big issue for principals.

Research Question Two

Research Question 2 was: How do principals describe their support of teachers in the use of technology? This study showed most principals felt teachers did not have enough technology professional development nor did they take full advantage of the professional development offered. The principals stated the teachers were not trained on proper implementation of technology equipment or technology integrated lesson plans to help them integrate technology in the classroom. Higher education programs were not training principals and teachers on how to use technology as an instructional tool. District coops are needed to step in and train principals and teachers on technology with rigorous professional development. Principals need to attend professional development that aligns with their interest of technology that way the comfort level should increase.

Recommendations to the Field

This study sought to explore the attitudes of principals toward technology and their support of teachers and teachers' use of technology. The recommendations provided will aid policy makers and school leaders in creating programs to help administrators become better equipped to implement and support technology use in their buildings.

I recommend principals receive regular training on current technologies and support for integrating those technologies into their administrative work and school building. If administrators are familiar with cutting-edge technology, they can set clearer, more efficient guidelines for technology use, such as social media and cell phones in the school curriculum. Professional development in technology understanding and usage can change the way educators communicate with the each other, students, parents, and the community.

I recommend schools give teachers a survey on what technology they would like to learn and then supply flexible professional development for both beginner and advanced technology users on the skills that teachers want to learn. This recommendation will help administrators support teachers by giving teachers an opinion of what technology interests them and how to stay abreast of new gadgets which may make the teachers more open to administrative assistance in implementation.

I recommend that principals be held accountable for their role as leaders in technology by being actively involved with the technology mission and vision of the school; they should have the ability to evaluate existing technology at the school, serve on technology infrastructure committees, write technology mission and vision statements, and run effective meetings using technology. This recommendation will help administrators to discuss and share their vision on

the importance and significance of technology integration in the subject areas with stakeholders, faculty, and staff, and learn to write a technology mission and vision for their school.

Principals can talk about the NETS-A, NETS-S, NETS-T, and ISLLC/ELCC to teachers in meetings to make them aware of what is being used in some schools and college and universities. This would give teachers a clear understanding of how important is to learn, model, and use technology in the instructional classroom. Principals can also visit schools that are technology style to see how it is used by administrators, faculty, staff, and students.

Recommendations for Further Research

The implications from this study could prompt further research in a variety of areas pertaining to technology. A specific area to consider would be more research studies on secondary high school principals' technology leadership attitudes and behaviors as they relate to the community. Further research on educational technology leadership in the community is promising because it incorporates the stakeholders who also represent the community. The role of the principal has changed dramatically with the impact of technology, and the community should be involved in creating a vision and support for the research. This study could focus on administrator input and ultimate output regarding technology infrastructure, planning, and budgeting. Another area to consider for further research is to focus on the integration and implementation of technology including infrastructure, planning, and budgeting by school administrators. Another area to consider investigating is the attitudes of all subject teachers as technology leaders as far as implementing technology curriculum integration and their technology teaching strategies. Another area to consider is the National Education Technology Standards (NETS) need to be evaluated annually by using empirical research.

This qualitative study only interviewed 10 principals from two school districts. This study did not include interviews from the more than 200 hundred other school districts in the state. Further research could focus on how all principals implement the technology standards in schools in Arkansas. Also further research could include how principals have included the technology vision and mission in their schools and how the role of leadership in technology has changed for principals.

Conclusion

Technology has changed the way people live, from use of the Internet to the way we communicate with text messages and e-mails. This change is also evident in our school system. This study traced how principals' leadership roles have changed in the school setting because digital natives and society in general have become technologically savvy. The findings for this study were generated from interviews and observations of high school principals. From this qualitative research study, I learned that administrators are apprehensive about social media in the classroom and that they need to become more familiar with it to better implement technology effectively in the classroom. To ease their apprehension, principals need to change their ways of thinking about social media's use. Professional development in technology skills needs to be more available and flexible for principals. I see, first-hand, how technology can be negative, because students are using social network tools in appropriately; but at the same time, if taught in the classroom by teachers who know how to integrate technology in the subject areas, the curriculum can create authentic learning with the students. Because of this, principals must be leaders of technology in their mission and vision for their schools. They must get involved with planning and infrastructure to ensure their schools are properly equipped with technology tools. Teachers will be better equipped to incorporate technology in the classroom if they have

adequate access as well as proper professional development. Students will be better able to compete in the digital age of the 21st century. This study calls for school administrators to be held accountable for the integration of technology into the curriculum at their school.

The findings from this study contribute to the current body of literature by corroborating the importance of following a successful technology program. The findings also add the need for administrators to become well-trained and well-versed in technology, allowing for better support and guidance for teachers charged with implementing technology in the classroom. The educational leader is responsible for full technology implementation; thus, besides working with teachers to implement technology in the classrooms, educational leaders must also serve on curriculum and budgeting committees to ensure proper funding and focus for technology use in their buildings.

It is no secret that technology is here and is here to stay. It is constantly changing, and for any organization to be viable in the 21st century, it must stay current and knowledgeable regarding technology. In education, administrators must take the lead in learning, understanding, and implementing technology at their schools. They, along with teachers, must learn to use technology and share, in the form of teaching and learning, with students or face an inevitable demise of the competitiveness of a future society.

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APPENDIX A

National Education Technology Plan 2010

Learning: Engage and Empower
Goal: All learners will have engaging and empowering learning experiences both in and out of school that prepare them to be active, creative, knowledgeable, and ethical participants in our globally networked society.

Our education system today supports learning, mostly in classrooms and from textbooks, and depends on the relationship between individual educators and their students. The role technology plays in the nation's classrooms varies dramatically depending on the funding priorities of states, districts, and schools and individual educators' understanding of how to leverage it in learning in meaningful ways. To prepare students to learn throughout their lives and in settings far beyond classrooms, we must change what and how we teach to match what people need to know, how they learn, and where and when they learn and change our perception of who needs to learn. We must bring 21st-century technology into learning in meaningful ways to engage, motivate, and inspire learners of all ages to achieve.

Assessment: Measure What Matters
Goal: Our education system at all levels will leverage the power of technology to measure what matters and use assessment data for continuous improvement.

Most of the assessment done in schools today is after the fact and designed to indicate only whether students have learned. Little is done to assess students' thinking during learning so we can help them learn better. Nor do we collect and aggregate student-learning data in ways that make the information valuable to and accessible by educators, schools, districts, states, and the nation to support continuous improvement and innovation. We are not using the full flexibility and power of technology to design, develop, and validate new assessment materials and processes for both formative and summative uses. Equally important, we now are acutely aware of the need to make data-driven decisions at every level of our education system on the basis of what is best for each and every student—decisions that in aggregate will lead to better performance and greater efficiency across the entire system.

Teaching: Prepare and Connect
Goal: Professional educators will be supported individually and in teams by technology that connects them to data, content, resources, expertise, and learning experiences that can empower and inspire them to provide more effective teaching for all learners.

Teaching today is practiced mostly in isolation. Many educators work alone, with little interaction with professional colleagues or experts in the outside world. Professional development typically is provided in short, fragmented, and episodic workshops that offer little opportunity to integrate learning into practice. A classroom educator's primary job is understood to be covering the assigned content and ensuring that students test well. Many educators do not have the information, the time, or the incentives to continuously improve their professional practice from year to year.

Meanwhile, policymakers and education leaders point to a lack of effective teaching and the need for greater accountability among teachers as the key to fixing education in America. Although the expectation of effective teaching and accountability for professional educators is a critical component of transforming our education system, we also need to recognize that we must strengthen and elevate the teaching profession. This is necessary to attract and retain the most effective educators and achieve the learning outcomes we seek for all learners.

Infrastructure: Access and Enable
Goal: All students and educators will have access to a comprehensive infrastructure for learning when and where they need it.

Although we have adopted technology in many aspects of education today, a comprehensive infrastructure for learning is necessary to move us beyond the traditional model of educators and students in classrooms to a learning model that brings together teaching teams and students in classrooms, labs, libraries, museums, workplaces, and homes—anywhere in the world where people have access devices and an adequate Internet connection. An infrastructure for learning is necessary to support a learning society in which learning is lifelong and lifewide. "Infrastructure" reminds us that even in virtual worlds, physical and organizational structures are needed to run a system. Building an infrastructure for learning is a far-reaching project that will require the participation and collaboration of individuals from all disciplines and types of institutions across the entire spectrum of education. It also will require education, business, and government as partners. And it will take leadership and a commitment to a shared understanding of its importance to transforming U.S. education.

Productivity: Redesign and Transform
Goal: Our education system at all levels will redesign processes and structures to take advantage of the power of technology to improve learning outcomes while making more efficient use of time, money, and staff.

To reach the president's goal of regaining global leadership in college graduation rates by 2020, the United States must increase the percentage of citizens holding college degrees from the current level of just under 40 percent to 60 percent. That is a sizable increase and, considering that college graduation rates in our country have held steady for more than three decades (OECD 2009a), a sizable challenge. Add to this challenge the projections of most states and the federal government of reduced revenues for the foreseeable future, and it is clear that we will not reach this goal simply by spending more money on education. At the same time, we must make a commitment to continuous improvement by continually measuring and improving the productivity of our education system to meet our goals for educational attainment within the budgets we can afford.

Department of Education, Office of Educational Technology

http://tech.ed.gov/netp

APPENDIX B

ARKANSAS DEPARTMENT OF Education

March 26, 2008

NEWS RELEASE

ARKANSAS RANKS IN TOP 16 IN LATEST ISSUE OF TECHNOLOGY COUNTS

Arkansas earned an overall grade of B-minus in Technology Counts 2008: STEM: The Push to Improve Science, Technology, Engineering, and Mathematics, which was released today by the Washington, D.C., based journal Education Week. Six other states scored a B-minus and nine states scored a B or above, with West Virginia receiving the only A.

"We are pleased that the grade of B-minus is better than the national average but we expect to do even better next year," said Jim Boardman, the Arkansas Department of Education's assistant commissioner for research and technology. "The State Board of Education adopted a new Arkansas Technology plan last month which will improve our score in capacity."

Grades were also given in specific categories: Access (Arkansas earned a C; the average state was a C); Use (Arkansas earned an A-minus and the average state a C-plus); and Capacity (Arkansas earned a B-minus and the average state a C).

"I am especially pleased with Arkansas' A-minus in "use" of technology compared to the national average of C-plus because access and capacity mean little if you are not using the technology," Boardman said.

The full reports are available on the Web at **www.edweek.org.**

APPENDIX B ***(continuation)***

Technology Counts Grading Breakdown

Arkansas Technology Grade

Use of Technology Grade (2009)	A-
Capacity to Use Technology Grade (2009)	B
Access to Technology Grade (2008)*	C- (71.0)

*In the absence of updated state-by-state data, state indicators and grades on access to technology carryover from last year's reporting.

I. Use of Technology (2009)

Use of Technology Grade	A-
State standards for students include technology (2008-09)	✓
State tests students on technology (2008-09)	
State has established a virtual school (2008-09)	✓
State offers computer-based assessments (2008-09)	✓

II. Capacity to Use Technology (2009)

Capacity to Use Technology Grade		B
State standards include technology (2008-09)	Teachers Administrators	✓ ✓
Requirements for an initial license include technology coursework or a test (2008-09)	Teachers Administrators	
State requires technology training or testing for recertification, or requires participation in technology-related professional development (2008-09)	Teachers Administrators	✓ ✓

(EPE Research Center, 2009)

III. Access to Technology (2008)*

Access to Technology Grade	C- (71.0)
Percent of 4th grade students with access to computers (2007)	95.0%
Percent of 8th grade students with access to computers (2007)	75.0%
Students per instructional computer (2006)	3.8
Students per high-speed Internet-connected computer (2006)	3.8

*In the absence of updated state-by-state data, state indicators and grades on access to technology carryover from last year's reporting.

(National Assessment of Educational Progress, 2007)

APPENDIX C

Observational Protocol

Length of Activity:	
Descriptive Notes	*Reflective Notes*

APPENDIX D

UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

December 9, 2014

MEMORANDUM

TO:	Mary Perkins Jacobs Carleton Holt
FROM:	Ro Windwalker IRB Coordinator
RE:	PROJECT CONTINUATION
IRB Protocol #:	11-09-106
Protocol Title:	*Phenomenology of Implementation and Effective Technology in High Schools by Principals Leadership in the Information Age*
Review Type:	☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB
Previous Approval Period:	Start Date: 09/27/2011 Expiration Date: 09/26/2014
New Expiration Date:	09/26/2015

Your request to extend the referenced protocol has been approved by the IRB. If at the end of this period you wish to continue the project, you must submit a request using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. Failure to obtain approval for a continuation on or prior to this new expiration date will result in termination of the protocol and you will be required to submit a new protocol to the IRB before continuing the project. Data collected past the protocol expiration date may need to be eliminated from the dataset should you wish to publish. Only data collected under a currently approved protocol can be certified by the IRB for any purpose.

This protocol has been approved for 10 total participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.

210 Administration Building • University of Arkansas • Fayetteville, AR 72701
Voice (479) 575-2208 • Fax (479) 575-3846 • Email irb@uark.edu

APPENDIX E

INFORMED CONSENT

Title: Principals' Perceptions of Technology Implementation in High Schools and their Effects on Leadership

Investigator(s): Mary V. Perkins-Jacobs, Ed.S
Graduate Student

Carleton R. Holt, Ed.D.
EDLE Graduate Advisor
College of Education and Health Professions
Department of Curriculum and Instruction
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Description: This qualitative study will focus on public urban high school principals and their mission, vision, strategic plan, attitude, and role as leadership in technology in their building. This research is intended to inform educational leaders and policy makers of the importance of research that involves administrators and their mission and vision of technology and planning in your school building.

Risks and Benefits: The benefits of this study include an opportunity to reflect on the leadership and philosophy of technology use in your building. There are no perceived risks to participation. I would like to interview you for my study.

Voluntary Participation: Your participation in the research is completely voluntary. There are no payments or college credits for participating.

Confidentiality: You will remain anonymous throughout this process, no identifiers will be released and all data collected will be locked and away and used only by me, the researcher. Only the researcher will know your name, but will not divulge it or identify your answers to anyone. All information will be held in the strictest of confidence.

Right to Withdraw: You are free to refuse to participate in the research and to with draw from this study at any time, your decision to withdraw will bring no negative consequences – no penalty to you.

Informed Consent: I, _____, have read the description, including the purpose of the study, the procedures to be used, the potential risks and side effects, the confidentiality, as well as the option to withdraw from the study at any time. Each of these items has been explained to me by the investigator. The investigator has answered all of my questions regarding the study, and I believe I understand what is involved. My signature below indicates that I freely agree to participate in this experimental study and that I have received a copy of this agreement from the investigator.

_____ _____

Signature *Date*

APPENDIX F

Field Notes Protocol
Access/site questions:
Observations:
Interviews:
Document Research:
Ethical Issues: