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A STUDY OF WEST VIRGINIA PRINCIPALS: TECHNOLOGY STANDARDS, PROFESSIONAL DEVELOPMENT, AND EFFECTIVE INSTRUCTIONAL TECHNOLOGY LEADERS

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requirements for the degree of

Doctor of Education
in
Curriculum and Instruction

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Huntington, West Virginia, 2007

Keywords: principals, technology leadership, NETS-A

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ABSTRACT

A Study of West Virginia Principals: Technology Standards, Professional Development, and Effective Instructional Technology Leaders

The role of the principal as documented in the literature is critical as the leader of change, the leader of technology reform, and the instructional leader of the school. In order to lead transformational change in technology, principals must be prepared to serve as the role model and hands-on user of technology. The NETS-A provide a framework for principals as they serve as the leaders for schools integrating technology into teaching and learning. This mixed methods study examined West Virginia principals' perceptions of the importance of the NETS-A, their interest in professional development in the NETS-A, and the implementation of the NETS-A.

This study found that West Virginia principals rated the technology standards of high importance to the role of the principal as instructional leader in the school. In addition, the interest in professional development related to the NETS-A indicated a willingness and eagerness of West Virginia principals to build the capacity necessary to lead transformational change in technology implementation in schools. Further, the study provided a look at the implementation of the standards by principals identified as effective technology leaders.

DEDICATION

He always understood the amount of time that I spent on the work and recognized when I needed extra attention, his strength and his encouragement to keep going. He never doubted me and helped me keep my eye on the horizon. I dedicate this work with love to my sure and steady compass in life, my bright and shining star, Mike.

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CHAPTER ONE: OVERVIEW OF THE STUDY

The role of the principal in technology integration in teaching and learning is often overlooked (Holland, 2000). The leadership role of the principal in facilitating the use of technology in the school depends heavily on the leadership capacity in technology. It is important to focus on the leadership of principals in technology to increase the benefits of technology in teaching and learning (International Society for Technology in Education [ISTE], 2002).

As West Virginia works toward systemic change in schools, competent school leaders are necessary to build technology-rich school environments (Holland, 2000). Across the country, the ability to integrate technology into classrooms for teaching and learning has been limited to "islands of excellence" rather than widespread documented success (Holland). The principal plays an important role in increasing technology integration in schools. In fact, technology leadership has greater success in promoting technology integration than technology infrastructure and expenditures (Anderson & Dexter, 2005).

To provide the change needed for transformational technology usage in West Virginia, adequate principal leadership capacity is a crucial component to successfully implement technology in schools (Brockmeier, Sermon, & Hope, 2005). Knowledgeable principals provide leadership to promote technology implementation in teaching and learning. The National Educational Technology Standards for Administrators (NETS-A) were released in November 2001. The standards developed by an International Society for Technology in Education (ISTE) initiative provide consensus among educational stakeholders of effective school leadership in technology (ISTE, 2002). The National

Association of Elementary Principals and the National Association of Secondary School Principals were key partners in the developmental process providing support for the importance of the role of the principal in technology implementation.

The NETS-A (2002) identify the following framework for effective leadership in technology integration (See Appendix A):

- Leadership and vision
- Learning and teaching
- Productivity and professional practice
- Support, management, and operations
- Assessment and evaluation
- Social, legal, and ethical issues.

The standards identify specific tasks that principals must perform to promote effective technology integration in the school. Since many administrators do not have the background to make systemic reforms, the purpose of the NETS-A is to provide assistance and guidelines for administrators in working toward school reform as it relates to technology (Brooks-Young, 2002). Effective leadership in schools today requires sustained effort on the part of the administrator. “It requires the ability to hold a global perspective of the school or district while at the same time being able to recognize and address all the pieces that affect programs including technology, curriculum, instructional practice, staff and community members, and managerial tasks” (p. 3).

While today’s students are moving forward with technology, many principals have been left behind. Numerous experienced administrators are not comfortable with important technology issues because of a lack of training or insufficient training (Gibson,

2001). A study in West Virginia's neighboring state of Ohio revealed that Ohio principals have statistically significant professional development needs in the area of educational technology (Allen, 2003).

Anderson and Dexter (2005) found that a school's technology efforts are seriously threatened without active administrative technology leadership. The findings of their study were consistent with the NETS-A while also reinforcing the validity of the technology standards. They concluded that technology leadership is even more important than technology infrastructure if educational technology is to be an integral part of a school (Anderson & Dexter).

Active administrative technology leadership is essential for technology implementation and the NETS-A provide a consensus among educational stakeholders as the framework for effective leadership in technology integration. As West Virginia moves toward more successful technology implementation and systemic change, it is important to examine the technology leadership roles of current administrators. In fact, the NETS-A were developed for application in situations including: the preparation of administrators, professional development design, and administrator assessment (ISTE, 2002). The purpose of this study is three fold:

- to determine how West Virginia principals rate the level of importance of the NETS-A,
- to determine West Virginia principals' interest in professional development related to the NETS-A,
- and through qualitative methods to describe the implementation of the NETS-A by West Virginia principals identified as effective technology leaders.

Background

School districts have allocated millions of dollars to acquire technology and to move schools into the 21st Century with technology usage in productivity and technology integration. Technology rich schools are ready for teachers to integrate the technology into instructional practices. Using technology for teaching and learning can build on the technological expertise of students as well as provide dynamic engagement for students in the learning context. Unfortunately the technological capacity available in our schools exceeds our ability to effectively integrate the technology into teaching and learning (Schrum, 2005). A crucial variable in facilitating technology integration into teaching and learning in the school is the leadership of the principal (Brockmeier et al., 2005).

Technology leadership outweighs the importance of technology infrastructure and expenditures on the desired outcomes for technology usage in a school (Anderson & Dexter, 2005). The integration of technology into teaching and learning requires administrative support as a key factor in the success of technological reform (Brooks-Young, 2002).

The International Society for Technology in Education (ISTE) and the National Education Technology Standards Leadership Team recognized this important role of administrative leadership in optimizing the benefits of technology usage in teaching, learning, and school operation (ISTE, 2002). The National Educational Technology Standards for Administrators (NETS-A) were released to provide indicators for effective technology leadership in schools. The standards were developed through a national consensus of educational stakeholders. A list of the educational stakeholders can be found after the chart in Appendix C. The NETS-A provide a standard for school

leadership in the implementation of technology in schools (ISTE, 2002). The framework includes these areas of leadership:

- *Leadership and vision* - According to the standards, principals need to participate in the development of a district technology plan as well as a school based, collaborative technology plan. The principal should lead the faculty and staff in promoting effective technology practices (ISTE, 2002).
- *Learning and teaching* - The effective principal should participate in all facets of professional development for the effective integration of technology in teaching and learning. The teaching and learning component of effective principal leadership includes the comprehensive analysis and interpretation of student data to develop instructional practices (ISTE, 2002).
- *Productivity and professional practice* - Professional practices including telecommunications and the use of a school website to promote communication and collaboration are important leadership practices. Current technology based management systems are used by effective principals (ISTE, 2002).
- *Support, management, and operations* - Effective principals provide staff development for sharing work and resources for school wide efficiency. Technology leaders promote the use of resources and funds as well as high-quality technology support services to promote the implementation of the technology plan (ISTE, 2002).
- *Assessment and evaluation* - Principal technology leadership includes modeling the use of technology for school improvement in student learning and productivity. The evaluation of instructional staff in technology implementation in

the teaching and learning process is established and guided by the effective principal (ISTE, 2002).

- *Social, legal, and ethical issues* - The effective technology leader is a principal who also models the social, legal, and ethical use of technology. Policies for healthy and safe computing including acceptable use policies are adhered to and enforced by the effective technology leader (ISTE, 2002).

Even with all of the guidelines for effective technology implementation and usage by principals, the record of technology reform in schools has been disappointing (Schrum, 2005). A report from the U.S. Department of Education (2004) concludes:

> We have not realized the promise of technology in education. Essentially, providing the hardware without adequate training in its use-and in its endless possibilities for enriching the learning experience-meant that the great promise of Internet technology was frequently unrealized. Computers, instead of transforming education, were often shunted to a "computer room," where they were little used and poorly maintained. Students mastered the wonders of the Internet at home, not in school. Today's students, of almost any age, are far ahead of their teachers in computer literacy. (p. 10)

Problem Statement

As schools move forward with implementing technology, administrative support is a key factor in success (Brooks-Young, 2002). The findings of the 1998 Teaching, Learning, and Computing nationwide survey confirm that technology leadership is more vital for effective utilization of technology in schooling than technology infrastructure

(Anderson & Dexter, 2005). Administrators should make decisions, model technology usage, and support the use of technology in the schools (Hall, 2000).

The role of the principal as essential in technology reform is documented and the standards modeling what best indicates effective technology leadership are recognized in education. However, decisions by districts across the nation point to the complex professional development needs of administrators since administrative support is key in success (Brooks-Young, 2002). Many administrators do not have sufficient training to be comfortable in the role of technology decision maker in the new digital age (Gibson, 2001).

Since the evidence shows that facilitating and maintaining change in schools depends on capable leadership (ISTE, 2002), it is imperative that we focus on technology leadership in West Virginia schools to optimize growth in schools. The NETS-A are recognized as important and useful guidelines for successful practice and could be used to provide important information on the level of leadership capacity for principals in technology transformational change in West Virginia. To move forward, West Virginia needs to assess the current leadership capacity for administrators in the critical role of technology leader. If levels of leadership capacity in technology are determined, West Virginia will have important information needed for promoting systemic change.

Purpose of the Study

In promoting growth and transformational change in West Virginia schools, the level of leadership capacity for principals in leading this change is important to assess. The purpose of this study is to determine how West Virginia principals rate the level of importance of the NETS-A, to determine West Virginia principals' interest in

professional development related to the NETS-A, and through qualitative methods to describe the implementation of the NETS-A by West Virginia principals identified as effective technology leaders.

The role of the administrator is a key factor to success in moving forward with technology implementation (Brooks-Young, 2002). Additionally, the International Society for Technology in Education and the National Educational Technology Standards Leadership Team recognized the importance of the role of administrators in effective technology leadership and provided standards as indicators of effective technology leadership (ISTE, 2002). The West Virginia executive and legislative branches of government also recognized the importance of technology and have provided strong support for instructional technology programs including $20 million for instructional technology in the school year of 2005 (West Virginia Department of Education [WVDE], 2005).

Significance

The success of a principal today is much different with the impact of 21st Century requirements (Flanary, 2000). This changing role of the principal "has to be one of the most challenging in today's society – as well as one of the most important" (Ferrandino, 2001, p. 441). As technology has facilitated dramatic changes in the world outside of school, it also is changing the look of teaching and learning within the school. "We have clearly reached a turning point. All over this country, we see evidence of a new excitement in education, a new determination, a hunger for change" (*Toward a New Golden Age*, 2004, p. 3). The results of this study will shape decisions in curriculum and instruction.

This study will provide important data about the technology leadership capacity of West Virginia principals as they serve as instructional leaders in teaching and learning. The principals' responses to the importance of the NETS-A, recognized as technology leadership indicators, will provide information on the capacity to lead change in technology integration. The description of principals recognized as leaders in technology will also provide information for decision making. Since the study will ask if principals are interested in professional development for each of the standards, the data will assist educational agencies in planning professional development. The data could facilitate changes in policy by the state legislature since the West Virginia executive and legislative branches of government have traditionally provided strong support for instructional technology programs (WVDE, 2005).

Implications for higher education and for professional development may be evident with the analysis of the data. The data will provide information to make decisions about curriculum and instruction leading to changes in teaching and learning. The leader in the educational environment today must have the ability to view a global perspective of the school as well as effectively manage the school and serve as the instructional leader in technology, curriculum, and instructional practice (Brooks-Young, 2002). Studies show the crucial role of the principal in improving teaching and learning in schools with the clear implication that principals must serve as the leader for student learning. "Researchers, policymakers, and educational practitioners agree: good school principals are the keystone of good schools" (Institute for Educational Leadership, 2000, p. 6). These findings should provide a look at principals in West Virginia and provide

grounds for making important decisions in relation to higher education programs and professional development opportunities.

The Education Alliance Report (2005) recognized the importance of professional development and included implications and recommendations for professional development in West Virginia (Education Alliance, 2005). This study should provide additional data to reveal the current status of administrators in West Virginia in terms of leadership capacity for technology integration. According to the National Educational Technology Standards for Administrators (ISTE, 2002), the effective 21st Century administrator is a user of technology with the underlying assumption that administrators should be competent users of information and technology tools common for information-age professionals. As West Virginia works to transform the implementation of technology in teaching and learning, this study could provide valuable information about the perceptions of administrators in West Virginia toward the level of importance of technology standards, their need for professional development in the standards, and their actual implementation of the standards. The results of the study should provide important information to guide decision making by West Virginia policymakers, the West Virginia Department of Education 21st Century Skills initiative, designers of professional development, higher education institutions, as well as state, county, and local school districts.

Research Questions

This is a mixed methods study with quantitative and qualitative components. Quantitative methods will be used to answer the following questions:

1. How important do West Virginia principals rate the NETS-A related to Standard I, leadership and vision, to the job of the principalship?
2. Are West Virginia principals interested in professional development in the NETS-A related to Standard I, leadership and vision?
3. How important do West Virginia principals rate the NETS-A related to Standard II, learning and teaching, to the job of the principalship?
4. Are West Virginia principals interested in professional development in the NETS-A related to Standard II, learning and teaching?
5. How important do West Virginia principals rate the NETS-A related to Standard III, productivity and professional practice, to the job of the principalship?
6. Are West Virginia principals interested in professional development in the NETS-A related to Standard III, productivity and professional practice?
7. How important do West Virginia principals rate the NETS-A related to Standard IV, support, management, and operations, to the job of the principalship?
8. Are West Virginia principals interested in professional development in the NETS-A related to Standard IV, support, management, and operations?
9. How important do West Virginia principals rate the NETS-A related to Standard V, assessment and evaluation, to the job of the principalship?
10. Are West Virginia principals interested in professional development in the NETS-A related to Standard V, assessment and evaluation?
11. How important do West Virginia principals rate the NETS-A related to Standard VI, social, legal, and ethical issues, to the job of the principalship?

12. Are West Virginia principals interested in professional development in the NETS-A related to Standard VI, social, legal, and ethical issues?

In addition to answering these questions, the study will use qualitative methods to describe the implementation of these standards by West Virginia principals identified as effective technology leaders by either the West Virginia Department of Education or the Regional Education Service Agencies.

Definitions of Technology Leadership Concepts

The NETS-A provide a description of administrators meeting the standards. A complete listing of the NETS-A can be found in Appendix A. The following is a summary of each standard.

1. Leadership and vision - the leader inspires and promotes a shared vision for technology integration while developing processes for planning and continuous improvement in technology integration through the use of research and decision making.
2. Learning and teaching - the leader promotes appropriate technology integration to impact the curricula, the instruction, and the learning environment when used to maximize teaching and learning through the development of higher-level thinking, decision-making, and problem-solving for the diverse needs of all learners.
3. Productivity and professional practice - technology is modeled effectively with the staff, parents, students, and the community through communication, collaboration, and engagement in continuous learning to advance the organization.

4. Support, management, and operations - policies and guidelines are in place to ensure that financial and human resources are allocated to assure the implementation of the technology plan as well as use management and operational systems.
5. Assessment and evaluation - a comprehensive system is in place including multiple methods for assessment and evaluation of the use of technology in all facets of the school. Assessment and evaluation of instructional practice is used to inform decisions on school improvement, personnel, and professional development.
6. Social, legal, and ethical issues - understanding and modeling of technology issues includes assuring equity of access, promoting responsible use of technology, ensuring safe and healthy practices in use, and enforcing copyright law.

Operational Definitions

1. West Virginia principal - a principal or assistant principal in a West Virginia school who responds to the *Survey of Technology Experiences* (See Appendix B for survey).
2. Level of importance - the respondent's rating on a scale of 1 to 7 with 1 = not important, 4 = important, and 7 = very important on the *Survey of Technology Experiences.*
3. Need for professional development - the respondent's selection of yes or no related to interest in professional development on the *Survey of Technology Experiences.*

4. Level of importance of leadership and vision - the respondent's rating on the leadership and vision component of the *Survey of Technology Experiences*.
5. Level of importance of learning and teaching - the respondent's rating on the learning and teaching component of the *Survey of Technology Experiences*.
6. Level of importance of productivity and professional practice - the respondent's rating on the productivity and professional practice component of the *Survey of Technology Experiences.*
7. Level of importance of support, management, and operations - the respondent's rating on the support, management, and operations component of the *Survey of Technology Experiences.*
8. Level of importance of assessment and evaluation - the respondent's rating on the assessment and evaluation component of the *Survey of Technology Experiences*.
9. Level of importance of social, legal, and ethical issues - the respondent's rating on the social, legal, and ethical issues component of the *Survey of Technology Experiences.*
10. Need for professional development in leadership and vision - the respondent's interest in professional development in the leadership and vision component of the *Survey of Technology Experiences*.
11. Need for professional development in learning and teaching - the respondent's interest in professional development in the learning and teaching component of the *Survey of Technology Experiences*.

12. Need for professional development in productivity and professional practice - the respondent's interest in professional development in the productivity and professional practice component of the *Survey of Technology Experiences*.
13. Need for professional development in support, management, and operations - the respondent's interest in professional development in the support, management, and operations component of the *Survey of Technology Experiences*.
14. Need for professional development in assessment and evaluation - the respondent's interest in professional development in the assessment and evaluation component of the *Survey of Technology Experiences*.
15. Need for professional development in social, legal, and ethical issues - the respondent's interest in professional development in the social, legal, and ethical issues component of the *Survey of Technology Experiences*.
16. Effective technology leaders - principals identified by either the West Virginia Department of Education or the Regional Education Service Agencies as modeling technology usage and recognized by these agencies as leaders in the field of technology.

Assumption and Limitations

This study will make the assumption that the National Educational Technology Standards for Administrators (NETS-A) are recognized as standards representative of principal technology leadership. The generalizability of the study may be limited because the population for the study is solely administrators in the state of West Virginia. Since the sample of principals for the interview process will be selected based on

recommendation, this data will not be generalizable but will be valuable for informational purposes.

This study will require administrators to self-report their perceptions of the level of importance of the technology standards and the need for professional development. The validity of the study will depend upon administrators' reflective responses to truly report their perceived level of importance of the standards. With the pressure for administrators to meet all of the demands of leadership required in 21st Century skills, principals may report what they think should be true as opposed to actual perceptions on technology standards. Administrators who do not see the significance of technology in teaching and learning may choose not to respond to the survey.

Summary

The study is presented in five chapters. Chapter 1 includes an introduction to the study, the background, a statement of the problem, the purpose of the study, the significance of the study, the research questions, the operational definitions, the assumption and limitations of the study, and a summary of the study. Chapter 2 provides a review of the literature and research related to the study. Chapter 3 outlines the methods and the research procedures for the study. Chapter 4 presents the findings and analyses of the data from the research questions. Chapter 5 presents the summary, conclusions, discussion, implications, and recommendations for future research.

CHAPTER TWO: REVIEW OF THE LITERATURE

Anderson and Dexter (2005) concluded that technology leadership is even more important than technology infrastructure if educational technology is an integral part of a school. This chapter carefully examines the complex role of the principal as change agent, technology leader, and instructional leader.

Principals as Change Agents

Technology as a Catalyst

The 21st Century will require mastery and application of new technologies in every field especially increased skills in mathematics and science (*Toward a New Golden Age*, 2004). According to the National Education Technology Report (U. S. Department of Education, 2004) students are not ready to meet these increased challenges.

> We have clearly reached a turning point. All over this country, we see evidence of a new excitement in education, a new determination, a hunger for change. The technology that has so dramatically changed the world outside our schools is now changing the learning and teaching environment within them. Sometimes this is driven by the students themselves, born and comfortable in the age of the Internet. (*Toward a New Golden Age*, 2004, p. 3)

The digital age is changing how we learn, how we teach, and how the education system works.

Since exposure to technology is rapidly changing how students spend time as well as learn, changes must occur in schools to keep up with the technology expectations of students. A recent study, *Generation M: Media in the Lives of 8-18 Year-Olds* (Azzam, 2006) was conducted by the Kaiser Family Foundation and Stanford University. The

researchers studied media use in a representative national sample of more than 2,000 3rd through 12th grade students in the United States. The study revealed that teens multitask as they engage in various media simultaneously with eight and one-half hours of media exposure daily. The report also revealed that nearly one-third of respondents talk on the phone, instant message, watch TV, listen to music, and surf the Web for fun while doing homework. Young people are increasingly developing multimedia centers in their bedrooms. The study revealed the percentages of 11 to 14 year olds having multimedia equipment in the bedroom:

- TV - 68%
- Video game console - 52%
- Computer - 31%
- Telephone - 39%

Students are becoming more and more immersed in media (Azzam).

The generation of students weaned on technology is forcing schools to change (*Toward a New Golden Age*, 2004). Even though students are changing, the field work for the National Education Technology Report (U.S. Department of Education, 2004) revealed that the application of educational technology was not always thriving. Currently, 99% of our schools are connected to the Internet with a 5:1 student to computer ratio. By providing hardware in schools without the necessary training in usage and how to enrich the learning experience, we have not realized the potential and promise of technology in education. “Computers, instead of transforming education, were often shunted to a ‘computer room,’ where they were little used and poorly maintained.

Students mastered the wonders of the Internet at home not in school" (*Toward a New Golden Age*, 2004, p. 3).

According to Rod Paige, former US Secretary of Education, "Education is the only business still debating the usefulness of technology. Schools remain unchanged for the most part, despite numerous reforms and increased investments in computers and networks" (*Toward a New Golden Age*, 2004, p. 9).

Research on computer-based instruction in education continues to send the important message that technology is a means to an end not the end itself. Technology is a tool for educators to use in achieving learning goals, not the goal itself. However, many schools are making investments and making decisions before developing clear plans and goals for change in technology usage (Ringstaff & Kelley, 2002). The research consistently points to the following conditions that favor productive outcomes: technology used as part of a broad-based reform effort; adequately trained teachers for using technology; teachers' changed beliefs about teaching and learning; sufficient and accessible technology resources; and technology integrated into the curricular and instructional frameworks (Ringstaff & Kelley, 2002). The Culp, Honey, and Mandinach (2003) report on 20 years of education technology policy saw technology as a catalyst for change. The investment in technology drew on three key themes: technology as a tool for addressing challenges in teaching and learning, technology as a change agent, and technology as a force in economics. The policies described delivering instruction in respect to diverse geographic regions, collecting and analyzing data, writing and communication, and availability of information. This report and many others also emphasized the global context of technology.

Technology Harnessed with Leadership

As technology works as a catalyst for change in the 21st Century, policies are written to move the change process forward in schools, provoking the use of technology in teaching and learning. The review of 20 years of policy suggested six recommendations that were consistent over time and included a seventh as the result of emerging technologies. The seven key recommendations as reported by Culp et al., (2003) are:

1. Improve access, connectivity, and requisite infrastructure;
2. Create more, high-quality content and software;
3. Provide more, sustained, high-quality professional development and overall support for teachers seeking to innovate and grow in this domain;
4. Increase funding from multiple sources for a range of relevant activities;
5. Define and promote the roles of multiple stakeholders, including the public and private sectors;
6. Increase and diversify research, evaluation, and assessment; and
7. Review, revise and update regulations and policy that affect in-school use of technology, particularly regarding privacy, and security (p. 7).

With technology serving as a catalyst for change, policymakers and stakeholders alike see the need to change and move schools forward. Optimistically, technology policymakers have provided vision for the impact of technology in education. "Recently, however, educational technologists have begun to understand with more nuance that technology needs to work in concert with other factors like effective leadership,

instructional priorities, and the day-to-day demands of classroom practice" (Culp et al., 2003, p. 22).

Noting the important role of leadership in educational technology, the National Education Technology Plan (U.S. Department of Education, 2004) details seven major action steps and recommendations. The first major action step is to strengthen leadership. "For public education to benefit from the rapidly evolving development of information and communication technology, leaders at every level – school, district and state – must not only supervise, but provide informed, creative and ultimately transformative leadership for systemic change" (*Toward a New Golden Age*, 2004, p. 15). The report additionally recommends that education must invest in leadership development programs to prepare leaders at every level as technology leaders in decision making and organizational change (*Toward a New Golden Age*).

As leaders realize the importance in decision making and organizational change, research plays an important role in the decision making process. Kimble (1999) examined research reports and studies to find opinions and conclusions on a continuum of results from using technology. Since technology is used to keep records, to create proposals, to gather information, to perform simulations, to construct knowledge, to access distance learning, and to collaborate for all aspects of learning and work, leaders must be informed to provide the transformational leadership for systemic change.

Research studies and meta-analyses illustrate how technology can have positive results on student learning in certain conditions. The research should be interpreted carefully in making decisions about technology integration because of the possible narrow conditions of any study. Research methods on studies about technology and

student learning are changing rapidly (Kimble, 1999). Some research studies demonstrate increases in student learning when technology is used for problem solving and collaboration. Technology used to support writing in schools can make a positive difference in the quality and quantity of writing. Further, properly implemented technology can increase self-confidence and eagerness to learn (Kimble).

Using the research available, administrators should have a plan to integrate data systems to increase efficiency and improve learning. Data from instructional systems and from administrative systems should be analyzed to understand the relationships between student achievement, decision making, and resource allocation. Strong leadership coupled with a willingness to restructure the learning environment is necessary for reform in the system. "Technology ignites opportunities for learning, engages today's students as active learners and participants in decision-making on their own educational futures and prepares our nation for the demands of a global society in the 21st Century" (*Toward a New Golden Age*, 2004, p. 17). Society wants educators to increase the technology used in their curricula and in professional development programs. All stakeholders including teachers, administrators, and media specialists must see the powerful capacity in technology usage if it is used properly (Mid-continent Research for Education and Learning [McREL], 2001). Technology harnessed with leadership could result in the changes required to meet 21st Century demands.

Deep Change

As changes in technology influence teaching and learning, administrators must be willing to support and lead school improvement. From a study of a large school district in California implementing a standards-based educational system; Ogawa, Sandholtz,

Martinez-Flores, and Scribner (2003) described essential elements required in a system for educational improvement. As a result of the in-depth study, they listed the following elements for educational improvement:

- Set specific goals for students to achieve the standards.
- Instructional technology for goal realization.
- Professional development in the technology.
- Monitoring to assure technology execution.
- Evaluate the goal attainment.
- Use feedback to adjust the plan. (p. 162-163)

Since educational change is so important to school improvement, principals play a pivotal role in any change movement that results in deep change. Principals must lead the quest and model commitment to the process.

> Deep change begins with organizational leaders who are dissatisfied with the current way of doing things or who have a vision of a new way of doing things. Even if change is imposed upon them through new policies or legislation or from changes in their community, leaders determine the extent to which they want to catalyze deep change. Many leaders hoping for significant change believe that it is possible to release the potential of their staff, but have been unsuccessful doing so in the past. Some of these leaders may have experienced what is possible when people live up to who they can be. They know it can be achieved; they just don't know how. Organizational leaders often seek to learn a different way of working. Hence, a fundamental condition for change work is that people select it for themselves. Organizations cannot be sold on creating changes; however,

> organizational change is dependent on a leader who desires change, believes it is possible, and is committed to helping it happen. (Baird-Wilkerson, 2003, p. 28)

True change in an organization requires individuals to gather important information, create new information, and react to new ideas while spawning methods for sustaining the change. New knowledge must be created within the organization by creating an atmosphere of idea exchange, an information rich environment, and a reflective process on the ideas and information collected. The end result is moving knowledge into action. The leader in this process empowers individuals to use inquiry with reflection to understand the change necessary (Baird-Wilkerson, 2003).

For organizational change to take place, leadership requires articulating a compelling vision and linking the necessary action steps to accomplish the vision. All necessary tasks whether they are small or large require articulation and connection to the vision. Since vision refers to the future which is uncertain, requires change, and possibly holds a degree of fear for participants; the vision must be clear to guide the organization. Leaders can build trust through a vision that becomes a blueprint for the organization. With an effective vision, the leader can help individuals understand their relationship to the big picture and their importance to the organization (Reeves, 2006). Reeves provided the following example of how the vision can be communicated to illustrate meaning and impact for technology change.

> Jean, you've got a great future here. Your integrity and work ethic are terrific, and the way that you collaborate with your colleagues is a real model for others.
>
> You've probably noticed that we're using a lot more technology now than when you first came here, and I see us moving in that direction in the future.

> Technology will never replace human intelligence and creativity, but we've got to use every technology tool we can, including some new ones that neither one of us has learned yet, to serve our stakeholders. With your abilities and advanced technology, I can see you doing great things in the future. I'd like to support you in some professional development to build your technology skills. What do you think about it? (p. 37)

This sample illustrates the important role of the leader in articulating a compelling vision that could result in deep change.

Leaders of Technology Change

As the leader of change, the principal plays an important role in the technology change process as a member of an effective leadership team. Complex organizations require effective communication of the leadership team. Leaders of change should know the skills of webcasting and emailing as essential for communication with a wide audience of stakeholders without forgetting the power of written and verbal communication in the change process. "In the 21st Century, you can communicate with millions of people at once but the power of personal communication, voice to voice, pen to pen, heart to heart, is undiminished by technology" (Reeves, 2006, p. 59).

Fullan (2001a) wrote about leadership improvement by focusing on some key dimensions of leadership. Fullan explained moral purpose in leadership as a means of making a positive difference with others as well as society as a whole. It is also essential for leaders to understand the change process. He suggested that the common factor in every successful change initiative is an improvement in relationships. Knowledge creation and sharing along with coherence making are valuable frameworks for leading.

These leadership components surrounded by energy, enthusiasm, and hopefulness provide the framework for leadership during change initiatives (Fullan, 2001a).

With technological changes, schools need to see the great potential for enhancing teaching and learning. Principals must provide leadership for change developing knowledgeable teachers so that technology does not become an electronic workbook. Principals must have the skill and knowledge to know how to balance technology resources without ignoring other resources needed by the school. The purchase of computers must be balanced with the need for other instructional materials. Therefore, principals must make wise purchasing decisions by using vision and understanding the possibilities as well as the pitfalls. Principals must have the skills, capacities, and commitment to be an instructional leader. "Without leadership, the chances for systemic improvement in teaching and learning are nil" (Tirozzi, 2001, p. 438).

Technology Changes in West Virginia

Traditionally, the executive and legislative branches of government in West Virginia have provided strong support for instructional technology programs (WVDE, 2005). In looking at the change process for technology in West Virginia, the West Virginia Governor's Office of Technology conducted an online survey in 2005. Kent (2005) evaluated the results of the online survey. Approximately 600 teachers from all grade levels - kindergarten to grade twelve responded. The sample size was satisfactory to conclude that results were representative of West Virginia teachers in general. Teachers responded to questions regarding their use of technology and identified barriers to expanding and increasing effectiveness in using and teaching with technology (Kent, 2005).

Most of the West Virginia teachers were enthusiastic about using technology in teaching and for administrative purposes. While the greatest use according to the survey was for administrative tasks, teachers saw technology as a great way to increase learning and enjoyment for students. The two greatest barriers identified from the study were an inadequate number of computers and the age of computers. Respondents also noted concern for fixing computer problems and a need for more technical support. Teachers were not as willing to use technology because of the unreliable computers and the lack of technical support (Kent, 2005).

The survey was consistent between teacher responses and student responses. Results provided direction for delivery of technology in West Virginia to move forward. More and better computers are the first priority. Improving access to computers at school and at home is necessary along with Internet access itself. The survey concluded that professional development programs in integration and application were very important while improved tech support was vital (Kent, 2005).

As West Virginia studies results of the survey, the role of school leaders in this change process is evident. West Virginia principals can see the need for change and the need for continued professional development as indicated in the survey. Professional development was strongly indicated in the survey as an issue since teachers expressed a need for more training. “Most had six or fewer hours of instruction in technology and felt that amount to be inadequate” (Kent, 2005, p. 2). The continuous updating of skills was viewed as essential. Respondents indicated that integrating technology is the most pressing professional development need.

The challenge in technology is to successfully provide opportunities for all students. “Legislators, educators and administrators all can have a positive impact on student success by addressing both the role of technology in our classrooms and the infrastructure necessary to support it” (Education Alliance, 2005, p. 6). The Education Alliance Report included implications and recommendations for professional development in West Virginia. The professional development needs should be prioritized. “Provide standards-based technology integration strategies training for school administrators” (p. 7). The report also recommended technology integration training for teachers.

Investments in Technology

Investments in technology impose major dilemmas for decision makers. Technology is not considered a frill but is an important part of curriculum. The expense is a reality facing administrators. Naturally, administrators want to know if the level of spending makes a difference in student learning (Ringstaff & Kelley, 2002). Since schools are using technology in different ways and for different purposes, the results vary. Teachers have different levels of knowledge and skills as well as different organizational plans for implementation in schools. “Where technology is used as a tool to support standards-based teaching of complex thinking and problem solving, and appropriate assessments measure student gains, those gains can be impressive indeed” (Ringstaff & Kelley, 2002, p. 1).

According to the Partnership for 21st Century Skills (2006), American schools must do a better job at preparing all students for success in the 21st Century. The Partnership shared a vision for learning that can strengthen American schools and

identified six key elements including: core subjects, 21st Century content, learning and thinking skills, information and communications technology, life skills, and authentic assessments. Technology was one of the six key elements. Students must be able to use technology to develop content knowledge and skills. Using technology, students can think critically, solve problems, use information, communicate, innovate, collaborate, and know how to learn. One of the recommended action steps by the Partnership for 21st Century Skills for state governments was to provide leadership training for superintendents and principals for supporting 21st Century skills in schools (Partnership for 21st Century Schools, 2006).

Additionally, the CEO Forum Report (2001) was the culmination of five years of exploration on the impact of technology on education. The report concluded that the national investment in technology should focus on the building blocks of student achievement. Schools must use technology that includes opportunities for achieving 21st Century skills. The CEO Forum (2001) named 21st Century skills to include: digital literacy, inventive thinking, effective communication, teamwork, and creating high quality products. Therefore, investments in technology must include not only financial investments for equipment but investments to provide professional development to ensure growth for change.

Phases of the Change Process

Technology skills are listed with importance in moving forward in the 21st Century (CEO Forum, 2001, Partnership for 21st Century Skills, 2006). In the move toward change, Fullan (2001b) reminded educators of the phases in the change process: initiation, implementation, and institutionalization. The principal has become

increasingly important in the change process. “The principal has always been the ‘gatekeeper’ of change, often determining the fate of innovations coming from the outside or from teacher initiatives on the inside….Principals are now expected to lead change, and thus they have become a critical source of initiation” (Fullan, 2001b, p. 59).

“All major research on innovation and school effectiveness shows that the principal strongly influences the likelihood of change, but it also indicates that most principals do not play instructional or change leadership roles” (Fullan, 2001b, p. 82). Managing change is a complex process and the principal is the person most likely to promote change with effective implementation. The principal can shape organizational conditions including: shared goals, collaboration, and monitoring (Fullan).

The change process for technology implementation was documented by the long-term Apple Classroom of Tomorrow (ACOT) project. For technology to be used fully in K-12 schools, changes take place over years and require significant professional development and support for teachers as they move through the stages of instructional evolution for using technology. The researchers from the long-term ACOT project identified five stages of instructional evolution for using technology in instruction. The stages included: the entry stage, the adoption stage, the adaptation stage, the appropriation stage, and the invention stage. Advancing through all stages is a multi-year process (Gordon, 2000).

Whether the phases of the change process indicated by Fullan (2001b) of initiation, implementation, and institutionalization are used or the stages of change in the instructional evolution for using technology in instruction from the ACOT project of entry stage, adoption stage, adaptation stage, appropriation stage, and invention stage; the

role of leadership in change is important. The principal can shape organizational conditions including: shared goals, collaboration, and monitoring to promote change with effective implementation (Fullan, 2001b). The role of the principal as change agent is more and more vital as we move into the 21st Century.

Principals as Technology Leaders

Instructional Leadership and Technology

More than $388 billion dollars were spent on public education in the United States in the 2002-2003 school year (National Center for Educational Statistics, 2005). Even though this impressive investment in education indicates the high level of interest and concern for the quality of education provided for our students in schools, the most progress at the state and local school levels in the implementation of technology took place when leaders were energetic and committed to technology implementation. In fact, leadership is the single most important factor affecting the successful integration of technology (Anderson & Dexter, 2005; *Technology in Schools*, 2002).

Lezotte and McKee (2002) confirm the important role of the principal in an effective school. As the instructional leader, the principal communicates persistently and effectively with school stakeholders, while managing the instructional programs with great understanding. Since schools are complex organizations requiring the strong leadership of the principal, the voice of the principal is essential in the articulation of the mission in an effective school (Lezotte & McKee).

As the leader of the *Effective Schools* movement, Lezotte compiled the correlates of *Effective Schools* to include: instructional leadership; clear and focused mission; safe and orderly environment; climate of high expectations; frequent monitoring of student

progress; positive home-school relations; and the opportunity to learn and student time on task. Instructional leadership remains high on the list of importance for the role of the principal. “The Correlates of Effective Schools provide school improvement teams with a comprehensive framework for identifying, categorizing, and solving the problems that schools and school districts face” (Lezotte & McKee, 2002, p. 20).

Even though technology was not listed as a Correlate for Effective Schools, Lezotte and McKee (2002) identified technology as one of the essential components of sustainable school reform. Technology can streamline processes and allow administrators to make decisions based on data. Technology can also facilitate student achievement through monitoring and intervention. "However, technology can also be an unwieldy beast, consuming inordinate amounts of time and generating significant amounts of frustration, particularly if it is instituted without clear goals, careful planning, and adequate staff training” (Lezotte & McKee, 2002, p. 57). Instructional leadership is the key to providing appropriate articulation of the school vision and school goals in technology.

Nearly twenty years after the federal report *A Nation at Risk,* the No Child Left Behind Act of 2001 (NCLB) included recommendations on technology as a component of systemic school reform. Repeated references are made to using technology as an important source for supporting teaching and learning as well as the recommendation that all eighth graders should be technologically literate. The level of emphasis on technology reflects the growing level of importance for using technology to communicate, to locate information, to manage information, and to support learning (Culp et al., 2003).

As school leaders and government policies define the importance of technology, the statistics of how students are impacted by technology also provide important data for decision making. “Teen use of the Internet at school has grown 45% since 2000” (Hitlin & Rainie, 2005, p. 1). The Pew Internet Project survey found that 87% of all youth between the ages of 12 and 17 use the Internet. This percentage translates into about 21 million students. About 16 million of these students say they use the Internet at school. Even though Internet usage has increased, the study shows that 32% of all teens do not use the Internet at school at all (Hitlin & Rainie). The role of the instructional leader in technology change can shape the organizational conditions so that schools achieve effective technology implementation.

Importance of Technology Leadership Standards

The International Society for Technology in Education (ISTE) collaborated with the Technology Standards for School Administrators Collaborative (TSSA) to lead the effort in the development of technology standards for administrators. As a result the National Educational Technology Standards for Administrators (NETS-A) were developed. The effective use of technology across school systems is important to systemic reform in schools. The vision of the TSSA Collaborative was to produce a document that identified the core skills and knowledge necessary for administrators to know how to be effective as school leaders (ISTE, 2002).

The core knowledge identified by the TSSA was extended to address specific needs of administrators that serve as superintendents, district leaders, principals, and assistant principals. The NETS-A are important indicators to illustrate effective technology leadership in schools. The standards do not list minimum or maximum skills

for educational leaders and do not provide lists for effective technology integration. The standards do provide the results of a national consensus indicating effective technology leadership for schools. However, the results are not meant to stifle new technology development or innovations for school leadership (ISTE, 2002).

The ISTE NETS-A project partners included: American Association of School Librarians, American Federation of Teachers, Association for Supervision and Curriculum Development, The Council of Chief State School Officers, Council for Exceptional Children, International Society for Technology in Education, National Association of Elementary Principals, National Association of Secondary School Principals, National Council for Accreditation for Teacher Education, National Education Association, National Education Association Foundation for the Improvement of Education, National School Boards Association's Education Technology Programs, Public Broadcasting Service, and Software & Information Industry Association (ISTE, 2002).

Administrators play many different roles in schools based on many variables including: size of school, size of school system, school community, level of site-based management, and other demographics. The standards can be viewed with the local context in mind. The standards were developed for application in many situations including: preparation of administrators, professional development design, administrator assessment, administrator evaluation, job descriptions, accountability, accreditation, certifications, goal-setting, self-assessment, and designing technology tools (ISTE, 2002).

An underlying assumption of these standards is that administrators should be competent users of information and technology tools common to information-age

> professionals. The effective 21st Century administrator is a hands-on user of technology. Many of the benefits of technology are lost for administrators who rely on an intermediary to check their e-mail, manipulate critical data, or handle other technology tasks for them. While technology empowers administrators by the information it can readily produce and communicate, it exponentially empowers the administrator who masters the tools and processes that allow creative and dynamic management of available information. (ISTE, 2002, p.2)

National Educational Technology Standards for Administrators

ISTE National Educational Technology Standards (NETS) and Performance Indicators for Administrators are summarized in this section. For more detail, the complete set of standards can be found in Appendix A.

The focus of Standard I is leadership and vision. The school leader inspires others to share a vision for technology integration while creating a culture conducive for attainment of the vision. As well as facilitating the development of the vision, the leader must create a process for building and maintaining a technology plan to achieve the vision. A culture permeated by promotion of continuous innovation with technology through risk taking, research, and decision making is important to achieve this standard (ISTE, 2002).

Standard II provides guidance in learning and teaching for educational leaders. Curricula, instructional strategies, and learning environments are all considerations for technology integration to maximize teaching and learning. Appropriate technologies must enhance and support learning for the development of higher-level thinking, decision-making, and problem-solving in an environment that meets the individual needs as well

as diverse needs of learners. Professional learning opportunities are part of the culture supporting improved learning and teaching with technology (ISTE, 2002).

Productivity and professional practice comprise Standard III. The school leader models effective technology usage with the staff, parents, students, and the larger community through communication, collaboration, and engagement in sustained, professional learning. By maintaining an awareness of emerging technologies, a school leader advances the organization through appropriate technology use (ISTE, 2002).

Standard IV addresses support, management, and operations as necessary components for technology leadership. Policies and guidelines are necessary to implement and use management and operational systems. Financial and human resources are allocated to assure the implementation of the technology plan with procedures to maintain continuous improvements with technology (ISTE, 2002).

To accomplish the assessment and evaluation in Standard V, the school leader must use technology for planning and implementation of a comprehensive system for assessment and evaluation. Multiple methods are used to evaluate and assess appropriate uses of technology in all facets of the school. Technology is used for administrative duties as well as analysis of data for improving instructional practices. Assessment of staff is used to provide data to inform personnel decisions and facilitate quality professional development (ISTE, 2002).

Standard VI outlines the social, legal, and ethical issues for educational leaders to understand and model. The leader ensures equity of access, promotes responsible use of technology, guards privacy and security, promotes safe and healthy practices in the use of technology, and clearly enforces copyright law (ISTE, 2002).

Implementation of Technology Standards

Essential conditions for implementing the NETS-A were also identified and published by the ISTE organization. The essential conditions include: shared vision, equitable access, skilled personnel, professional development, technical assistance, content standards and curriculum resources, student-centered teaching, assessment and accountability, community support, support policies, and external conditions (ISTE, 2002).

These identified conditions are essential for implementation of the standards for technology leadership. Shared vision included proactive leadership for educational technology. Technology needs to be accessible for all members of the school with skills developed in leaders and personnel to fulfill job responsibilities. Professional development is essential for all job assignments to ensure that all skills are developed. In addition to professional development, technical assistance must be available for maintaining the technology. Leaders and teachers must be familiar with content standards as well as the available resources for supporting teaching and learning. These conditions are necessary for teachers to facilitate student-centered classrooms using technology in teaching and learning. Additionally, the system assesses the technology to ensure accountability in effective technology use in teaching and learning. Finally the support of the community and policies are necessary to allow for effective implementation of technology (ISTE, 2002).

Indicators of Systemic Reform in Technology

Systemic reform in technology includes effectively using technology in the entire system. “There is a wealth of evidence showing that facilitating change in schools, and

especially maintaining that change, depends heavily on capable leadership. It is imperative, therefore, that we focus on leadership for technology in schools if we are to optimize its benefits in learning, teaching, and school operations" (ISTE, 2002, ¶1).

Policymakers use awareness of the role of technology in education to make decisions. Technology policymakers have provided vision for the impact of technology in education. "Recently, however, educational technologists have begun to understand with more nuance that technology needs to work in concert with other factors like effective leadership, instructional priorities, and the day-to-day demands of classroom practice" (Culp et al., 2003, p. 22). The role of leadership and its importance to effective technology integration appears frequently in the literature.

The work of Anderson and Dexter (2005) examined the technology leadership attributes found in technology related programs and the differences that these attributes made on the success of programs. They used the National Educational Technology Standards for Administrators (NETS-A) and integrated the prescriptive technology leadership literature. They analyzed the results of the 1998 Teaching, Learning, and Computing (TLC) survey of over 800 nationwide schools to determine the leadership characteristics as well as the impact on technology implementation. "The findings confirm that although technology infrastructure is important, technology leadership is even more necessary for effective utilization of technology in schooling" (Anderson & Dexter, 2005, p. 49). The study examined how leadership was associated with classroom technology and how the role of the leader intertwines with technology infrastructure and other characteristics of the school. The TLC survey collected data several years ago including technology and leadership dimensions. This survey was the last national survey

to include both dimensions since the role of technology has not qualitatively changed since the data were collected; the data provided important meaning in exploring the role of leadership (Anderson & Dexter, 2005).

"All of the literature on leadership and technology acknowledges either explicitly or implicitly that school leaders should provide administrative oversight for educational technology" (Anderson & Dexter, 2005, p. 51). Anderson and Dexter (2005) suggested that technology leadership and infrastructure have a reciprocal relationship since infrastructure shapes technology leadership as well as technology leadership shaping infrastructure. They created a model illustrating leadership as the mediator and intervention between infrastructure and technology outcomes.

Anderson and Dexter (2005) identified eight components as indicators from the TLC survey to represent the construct of school technology leadership. The indicators of technology related activities for technology leaders included the following:

1. A *Technology committee* was an important indicator (Anderson & Dexter, 2005). The NETS-A indicate in the "Leadership and Vision" section that a leader inspires a shared vision school wide as the key to ensuring resources, processes, and climate for successful implementation of technology (ISTE, 2002).
2. *Principal days* was an indicator of all technology standards since it referred to principals spending five or more days a year on technology issues including planning, maintenance, and administration (Anderson & Dexter, 2005).
3. *Principal email* referred to the principal's regular use of email to communicate with at least two groups represented by teachers, administrative staff, students, or parents (Anderson & Dexter, 2005). The NETS-A standard on "Productivity and

Professional Practice" stresses that principals model technology use through email for communication with school stakeholders and to increase productivity (ISTE).

4. The *staff development policy* of a school must include technology (Anderson & Dexter, 2005). The NETS-A in "Learning and Teaching" state that educational leaders provide quality professional learning opportunities and ensure that staff take advantage of the opportunities (ISTE).
5. The *school technology budget* was an indicator if the principal or other school leader was the sole authority over spending (Anderson & Dexter, 2005). The NETS-A under "Support, Management, and Operations" indicate that leaders allocate financial resources to complete and sustain technology in the school plan (ISTE).
6. *District support* was reported by principals as costs supported by the district in technology needs. None of the NETS-A directly deal with district support (Anderson & Dexter, 2005).
7. The *grants* listing meant that a school or district had a grant within the last three years for a program where at least 5% of the money was dedicated to costs related to computers (Anderson & Dexter, 2005). Several standards in the NETS-A may be addressed depending upon the allocation of funds.
8. The *Intellectual property policy* is enforced including copyright (Anderson & Dexter, 2005). The NETS-A "Social, Legal, and Ethical Issues" indicate that leaders should have policies enforcing copyright law and respecting ownership of intellectual property (ISTE).

Anderson and Dexter (2005) named these eight indicators as representative of important policies and organizational decisions required to facilitate and to improve technology implementation throughout the school. They selected these indicators not solely on their inclusion in the NETS-A but as indicators representing leadership in all domains as well as general indicators included in many of the NETS-A (Anderson & Dexter, 2005).

The technology outcomes in the study were developed from multiple questionnaire items from the TLC survey to look at the role of technology leadership on technology utilization in the school. The indicators for technology outcomes were Internet use, technology integration, and student tool use (Anderson & Dexter, 2005).

The Internet use outcome represented the frequency of teacher and student use of the Web and email for a variety of different purposes. The technology integration outcome measured the number of teachers actually integrating technology into the curriculum with various activities in the teaching and learning process. The student tool use indicator measured the extent that students did the following: used computers for writing reports and essays, used simulation in science and social studies, used spreadsheets, used databases, retrieved information from CD-ROMS, retrieved information from the Web, and used other computer-based resources (Anderson & Dexter, 2005).

Anderson and Dexter (2005) found that a majority of the schools had the five leadership characteristics of technology committees, staff development policies, intellectual property policy, principal days, and a technology budget. The remaining leadership characteristics were found in fewer than half of the schools. Less than half had

technology grants where at least 5% of the funding was dedicated to computer expenses. Only a third of the principals indicated that the districts were supportive of technology costs compared to other districts. The use of email to communicate with at least two of the following groups: teachers, administrative staff, students, or parents was reported by only 29% of the principals. Now that more schools have broadband Internet access, more principals would probably meet this email criterion. “However, this finding does suggest that principals may be slower in changing their own personal practice in using technology than they are in implementing school technology programs and policies” (Anderson & Dexter, 2005, p. 61).

The study concluded that technology leadership was clearly the strongest predictor of technology outcomes indicated by Internet use for email and web, technology integration, and student tool use (Anderson & Dexter, 2005). The statistical regressions confirmed “a very strong effect of technology leadership on the utilization and integration of technology. Second, they reveal that infrastructure and expenditure factors do not have relatively large direct effects on technology outcomes” (Anderson & Dexter, 2005, p. 70).

The report of the study operationalized the concept of school technology leadership and aligned the concept to policies, goals, budgets, committees, and supports to improve the use of technology in teaching and learning. The findings were consistent with the NETS-A and reinforced the validity of the standards. The study also confirmed the pivotal role of technology leadership in technology outcomes while revealing considerable diversity in technology leadership and support systems. “Perhaps the most important finding from our analysis is that technology leadership has greater leverage on

desired outcomes than does technology infrastructure and expenditures" (Anderson & Dexter, 2005, p. 73).

Anderson and Dexter (2005) suggested as a result of the analysis that without active administrative technology leadership a school's technology efforts are seriously threatened. The NETS-A standards of leadership and vision; learning and teaching; productivity and professional practice; support, management, and operations; and social, legal and ethical issues are supported in this work as important and useful guidelines for successful practice (Anderson & Dexter, 2005). The analysis found variation across demographic categories because of the possible limitation of the indicators for technology leadership. "However, administrators and other practitioners should understand that our study concludes that although technology infrastructure is important, for educational technology to become an integral part of a school, technology leadership is even more necessary" (Anderson & Dexter, 2005, p. 74).

Developing a Technology Vision

Technology discussions must include analysis of the digital divide. Anderson and Dexter (2005) suggested that funding infrastructure is important in eliminating the digital divide but that evidence is building that support services and other technology leadership processes are even more important to solving the problem (Anderson & Dexter, 2005). As a leader in technology, developing a vision and plan are essential for technology implementation and growth.

In examining the role of technology in education, the Regional Technology Education Consortia's (RTEC) Technology Plan Task Force provided a definition of a technology plan.

> A technology plan serves as a bridge between traditional established standards and classroom practice. It articulates, organizes, and integrates the content and processes of education in a particular discipline with appropriate technologies. It facilitates multiple levels of policy and curriculum decision-making, especially in school districts, schools, and educational organizations that allow for supportive resource allocations. (*Technology in Schools,* 2002, p. 11)

An effective technology leader uses the technology plan to promote changes in teaching and learning.

The literature supports the importance of leadership, vision, access, and integration in technology implementation. Technology planning and policies in terms of content includes vision, access, and integration. Vision is explained as the overall expectation for technology use with the understanding that the target audience must have access. The availability to the target audience for technology as well as the acquisition and deployment of technology is referred to as the access. Finally, technology integration is the implementation of strategies making technology useful in achieving the vision (*Technology in Schools*, 2002).

Leaders of schools or districts modeling effective technology integration have six actions in common as reported by Byron and Bingham (2001):

- Start with a vision of what technology integration can accomplish and share that vision with other stakeholders.
- Lead by example through modeling personal use of technology, continued participation in professional development, and articulating how technology can be used to support instruction and assessment.

- Support the faculty by recognizing their efforts to use technology, creating an environment that rewards taking risks, and attending staff development with the staff.
- Focus on those initiatives most likely to improve instruction and make certain staff members have the resources they need to succeed.
- Share leadership roles through committee work and decision-making.
- Use evaluation to further professional growth through teacher self-assessment instruments and classroom observation protocols that encourage effective use of technology (p. 4-5).

Principals acting as effective technology leaders inspire a common vision for technology implementation and promote the culture and environment to reach that vision. Beavers (2001) maintained that a new vision of professional development opportunities is necessary for educational technology to be used to the fullest. Professional development was described as "ongoing programs that are tied to your school's curriculum goals, designed with built-in evaluation, and sustained by adequate financial and staff support" (Beavers, 2001, p. 43). A professional culture must exist before the vision of technology integration is embraced.

In using technology in a school, leaders must decide how and what they want instead of letting the technology lead the project. Priorities should be identified and then determine the technology. Leaders think about the growth in the school and make the technology decisions based on this information, making sure to include the cost of maintenance, security, upgrades, and staff development before making decisions on technology. Leaders begin with pilot programs and roll the technology projects out in

stages since technology implementation should be refined and expanded by regular observation, questioning, and decision making (Bosak, 2000).

O'Neill and Conzemius (2002) profiled three schools that transformed their practice and highlighted the essential elements they found to indicate continuous improvement. The four areas were focus, reflection, collaboration, and leadership capacity. "Schools showing continuous improvement in student results are those whose cultures are permeated by: shared focus, reflective practices, collaboration and partnerships, and ever increasing leadership capacity" (p. 15). The power of focus was evident because it drove all the conversations, transactions, and processes at the school.

Research shows that when teachers see a vision of what can happen with technology by spending time in technology rich classrooms and observing the impact of technology on teaching and learning, they often take on the challenge of integrating technology themselves (Ringstaff & Kelley, 2002). The principal plays an important role in promoting that shared vision in the school.

Teaching and Learning with Technology

Educational leaders must also ensure that the curriculum design, learning environment, and instructional strategies maximize the learning and teaching. As educators examine the importance of technology in teaching and learning, they may want to change from "technology-as-teacher to technology-as-partner" (Jonassen, Howland, Moore, & Marra, 2003, p. 11) in the learning process. In the constructivist process students learn with technology. This assumption requires the educator to think of technology differently. Technology engages learners and consists of methods or strategies like cognitive learning and critical thinking. Learning with technology involves

constructive, authentic, and cooperative learning. Technology does not control or prescribe learners nor does it communicate meaning. Learning is supported by technology as the learner initiates and controls the intellectual interaction. As learners build meaning and representations, technologies can serve as intellectual tools to enhance and provide more meaning. Using this model, technology serves as a partner in the learning process (Jonassen et al., 2003).

Students learn from thinking while technology engages and facilitates thinking for the construction of knowledge. Knowledge is constructed with technology as a supportive tool. Technology is a vehicle used to explore knowledge and to construct learning. Learning by doing is supported through technology. Learning through conversing is supported through the social medium of technology. Technology also supports learning through reflection (Jonassen et al., 2003). Educators hoped "this new technology would sweep the schools and redefine educational practice, empowering teachers and students to attain greater heights in academic achievement" (Brooks-Young, 2002, p. 3).

Even though schools have invested large sums of money in computers, technology usage has not increased as expected. Bennett cites the reason as "teachers have not learned how to employ technology in their classrooms" (Bennett, 2002, p. 622). Without making needed changes, schools will not make improvements that can result from proper technology integration (Bennett, 2002). "Leadership is probably the single most important factor affecting the successful integration of technology into schools" (Byrom & Bingham, 2001, p. 4).

Duran (2002) looked at improving education for at-risk students through technology. The data were collected through surveys of students' computer access related

to low income and ethnic background, use of computers related to achievement, and case studies based on technology use. Duran found that access to computers and the Internet was important, but how the technology was being used was more important to all students, not just at-risk students. Technology provides an opportunity for students to take greater ownership in learning (Duran, 2002).

Educational leaders have moved past the problem of computers in the classroom to the challenge of implementing the technology into teaching and learning. Zhao, Pugh, Sheldon, and Byers (2002) researched the question of why teachers do not use innovative techniques when they have computers. They tried to discover the conditions necessary for technology innovation and the degree of success of technology innovation. The researchers studied a sample of the participants in a state technology innovation grant. Researchers found 11 factors related to technology implementation in the grant project. These factors included: technology proficiency, pedagogical compatibility, social awareness, distance, dependence, human infrastructure, technological infrastructure, social conditions and support. According to the study, teachers were more likely to implement technology if they viewed technology as a "means to an end, rather than an end in itself, and when they saw an intimate connection between technology and the curriculum" (p. 492).

With learning and teaching so important in technology implementation, "information literacy should not be considered a given, even among 'net-gen' students" (*Horizon Report,* 2006, p. 4). Critical thinking, research, evaluation, and creativity are needed more than ever for students to be successful. Many of these skills are still underdeveloped in students. Research techniques for gathering information, evaluating

information, and drawing conclusions online and offline are crucial in collaborative work (*Horizon Report*, 2006).

Pflaum (2004) performed a year long study of schools across the country to find out how computer technology was being used. “Students don’t spend enough time on computers to make a measurable difference in performance” (p. 5). He found that the average student in the schools he visited spent approximately one hour per week at a computer. Many students spent even less.

> I walked the halls and tallied computers. Rarely did I find more than one in five in use. These were informal counts, but I consistently observed that, at any given time, 80 percent of classroom computers sat unused…Under these circumstances, how much measurable effect on performance can we expect from the average hour-a-week of computer time that students have? (p. 5-6)

Some of the schools visited by Pflaum (2004) were more effective and committed to technology than other schools. The role of leadership became evident as Pflaum grouped the schools into four categories: schools with strong leadership and a clear technology focus, schools with strong leadership with unclear focus, schools with poor top-level support and lack of focus, and finally schools with severe technology problems.

Another study to illustrate the connection between teaching and learning and leadership was conducted by Piper in 2000. A Central Pennsylvania study of 160 teachers revealed that certain factors may influence the practice of the teachers using computers in the classroom. The teachers identified clerical/management use, academic use, and advanced use. The analyses resulted in significant relationships between computer uses and self-efficacy, experience and knowledge, professional development, perceptions of

leadership, and gender. “Self-efficacy was found to have a significant relationship with clerical/management and academic use of computers, while experience and knowledge, professional development, and perception of leadership demonstrated a significant relationship with advanced computer use” (Piper, 2000, p. v). Piper found that as computer use moved to advanced use, significance was found with the variables of experience and knowledge, professional development, and leadership.

Helping teachers effectively implement technology into teaching and learning is a growing challenge. The No Child Left Behind Act requires that 25% of state federal technology funding be used for providing professional development and that the professional development has to be research based. The impact of the professional development should be documented. A review of the studies on technology integration showed that the context for using technology is more important to the educator than the type of technology or the software (Cradler, McNabb, Freeman, Burchette, 2002).

> During the final decade of the twentieth century, schools in many countries spent huge sums running cables and buying computers to connect classrooms to the Internet. For this investment to pay dividends-to dramatically strengthen the skills with which students read, write, and learn about their world-schools must offset this spending on equipment with two critical elements: 1) a clear focus upon program goals and 2) the provision of extensive professional development opportunities for all teachers. (McKenzie, 1999, p. v)

In 1998 Wenglinsky (2005) began a series of studies to answer the question of whether or not instructional technology was a success or a failure in schools. Wenglinsky referred to “one bottom line: does using technology in schools raise student

achievement?" (p. 30). The series of studies used the National Assessment of Educational Progress (NAEP) database by "examining the link between computer use and student test performance" (p. 30). He looked at the scores from NAEP and the surveys from NAEP to measure how the classroom activities including computer usage correlated with student performance (Wenglinsky, 2005). The results indicated that quality was more important than quantity. Teachers' use of technology was important to students. "Using computers to help students work through complex problems, thus tapping higher-order thinking skills produced greater benefits than using computers to drill students on a set of routine tasks" (p. 30). The earlier NAEP tests revealed teachers using computers as drilling machines. In the 2001 NAEP study, the U.S. history assessment for 12th graders revealed where computer use impacted results on the history assessment. Students scored higher if they used computers for schoolwork outside of school. Students scored higher if they performed a number of generic tasks including: word processing, using computers for projects, charts, graphs, tables, and for communication (Wenglinsky, 2005).

Modeling Technology Implementation

The role of the principal is important as schools implement technology. The first action step in the National Education Technology Plan (2004) was to strengthen leadership. Educational leaders at all levels must provide informed, creative, and transformative leadership as well as provide supervision. Effective leadership should help education benefit from the rapid development of emerging technologies (*National Education Technology Plan*, 2004).

The West Virginia Department of Education (WVDE) and the Office of Technology and Information Systems (OTIS) presented a comprehensive West Virginia

Educational Technology Plan (2002-2006). The report recognized the International Society for Technology in Education (ISTE) National Educational Technology Standards (NETS) as important in planning and evaluating technology. The plan also recognized the role of the principal in successful technology implementation. “Educational administrators must take the lead to support the use of educational technology in the classrooms” (*West Virginia Educational Technology Plan*, 2002-06, p. 13).

The Institute for Educational Leadership sponsored a task force to examine school leadership for the 21st Century. The top priority of the principalship must be leadership for learning (Institute for Educational Leadership, 2000). The rules for principals have changed. A principal used to be an effective building manager, but now the principal has a crucial role in improving teaching and learning. “Learning doesn’t happen without leadership” (Institute for Educational Leadership, 2000).

Administrators using technology themselves understand the change process needed for successful technology integration. Administrators are empowered to make decisions and analyze data by effectively using technology (*Technology in Schools*, 2002). “The habits that produce significant change in teaching and learning begin with significant change in what leaders, think, say, and do” (Sparks, 2003, ¶ 2).

Principals who are effective leaders in technology integration use current technologies for management systems to access and maintain records. The effective technology leader uses a variety of media including telecommunications and a school website as a means of communicating with all stakeholders (*Technology in Schools*, 2002). The use of the word processor, spreadsheet, and database is no longer an indicator for effective technology integration. Administrators have new tools and opportunities

available for leading their faculty to the next level of performance, not literacy, but fluency (Shelly, 2000).

A top priority of the principalship is for principals to become "role models as technology users and supporters for students, teachers, and support staff" (Heaton & Washington, 1999, p. 4). "Leaders need to model the use of technology to change and improve the environment in which educators function" (Costello, 1997, p. 58).

Leadership of education reform implies a demanding and complex role for principals today. The success of a principal today is much different as a result of the 21st Century requirements (Flanary, 2000). The role of the principal "has to be one of the most challenging in today's society – as well as one of the most important" (Ferrandino, 2001, p. 441). "High achieving schools have strong, competent leaders" (Petzko, 2002, p. 3).

The principal has the complex role of leading changes and modeling technology implementation. The Mid-continent Research for Education and Learning (McREL, 2005) developed a solution for integrating technology into the classroom. The solution included building the capacity of school leaders to guide technology integration initiatives. The solution was designed to "increase student achievement through more effective instruction, curricula, professional development, and leadership" (p. 1).

Management of Technology

The effective leader relies on research to develop, implement, and monitor policies for technology implementation. Technology policies can be the background for a technology plan or the goal of the implementation of a technology plan. Acceptable Use Policies and policies for privacy of records are common policies implemented in schools

(*Technology in Schools*, 2002). Implementation of a technology plan includes timelines, benchmarks, purchasing, installation, training, and evaluation (*Technology in Schools*, 2002).

Allocating financial resources to ensure implementation of the technology plan is another role for the technology leader. A successful technology budget must include support for the system as well as funding to replace components as they become obsolete. The lack of either of these two components could result in a system not functioning effectively and ultimately result in a liability to the system (*Technology in Schools*, 2002). A successful district or school must look at the Total Cost of Ownership (TCO) for technology. Educational leaders must consider the TCO in successful implementation. Equipment costs must include replacement costs for equipment. The generally accepted life cycle for equipment in education is five years compared to businesses two year replacement (*Technology in Schools*, 2002). The effective leader understands and uses these implications to operate the school.

Professional Development for Technology Leadership

Professional development plays an important role in technology leadership. Educational leaders should engage in sustained job-related professional development using technology as well as assessing to determine professional development needs. The effective leader facilitates high quality professional development. The State Educational Technology Directors Association (SETDA) leaders met in 2003 to look at tools for improving education through effective integration of technology. Technology provides administration an opportunity to improve learning for students since technology is more than just an electronic tablet in education. Technology provides learners the opportunity

to experience skills and tools to enter the work force. Leadership at all levels is necessary for coordination of instruction and administration. “Leaders can build strong educational programs using technology by building partnerships; leveraging and providing resources; and ensuring that an educational technology program includes not only the hardware, software and infrastructure, but also the professional development, data management and integration resources to make it succeed” (George, 2004, p. 2).

Policymakers are expecting returns on all technology investments. “Across the nation, schools see highly qualified teachers, differentiated instruction, and informed data-driven decision-making as highly effective strategies for improving the academic achievement of all students-all strategies highly dependent on smart, integrated uses of technology” (Lemke, 2005, p. 1). The State Educational Technology Directors Association (SETDA) developed a framework for effective technology use over the last three years. *The Conditions for Effective Technology Use in Schools* included collaboration by the North Central Regional Education Laboratory [NCREL], the Metiri Group, the Milken Exchange, and numerous other groups. The frameworks included the following conditions: effective practice; educator proficiency; robust access anywhere, anytime; digital equity; and vision, systems and leadership (Lemke, 2005).

The State Educational Technology Directors Association (SETDA) completed the national report on trends in 2005. The report had data on surveys from 49 states representing 15,478 Local Education Associations. Seven major findings for national trends emerged from the data analysis including: strategies are in place to close the Achievement Gap; schools have a focus on new types of professional development; schools are doing more with less through collaborations; formula grants are an effective

method to sustain technology; states are making progress grappling with evaluation and research; through leadership, a knowledge base is emerging; and in many states, NCLB II D is the only source of funds (State Educational Technology Directors Association [SETDA], 2005). The professional development trend revealed the national understanding of the need for adequate professional development.

States are infusing money into technology to assist schools in technology integration. West Virginia funded the instructional technology program in 2003 with more than $24 million. Due to budgetary reasons, West Virginia appropriated only $20 million for instructional technology in the school year of 2005. Traditionally, the executive and legislative branches of government in West Virginia have provided strong support for instructional technology programs (WVDE, 2005).

Professional development is important in implementing technology. “Virtually every major study of successful technology use finds that teacher professional development is key” (Ringstaff & Kelley, 2002, p. 2). If teachers are trained, they use technology more often and in a variety of ways. Teachers need to practice the most productive ways to use technology to support learning. “They need time to explore, reflect, collaborate with peers, and engage in hands-on learning. Experts suggest the 30/70 rule: Spend 30% of the technology budget on equipment and 70% on the support of ‘human infrastructure’. By contrast, most school districts spend less than 10% on training” (p. 2).

Technology must be integrated into the very fabric of the school to promote continuous improvement. “Simply having educational technology won’t necessarily translate into higher student achievement outcomes” (Lezotte & McKee, 2002, p. 57).

Sustainable school reform includes the following technology applications: communication tools, learning tools, learning assessment tools, data collection tools, and accountability tools (Lezotte & McKee). The effective leader of technology embraces the necessity of professional development as an important tool for success.

The Principal as Instructional Leader

Leaders for Student Learning

An effective leader in today's educational environment holds a global perspective of the school while also recognizing every aspect of the comprehensive school program including technology. Becoming and remaining effective requires a leader to address all parts of the instructional process including the curriculum, the technology, the communication with stakeholders, and all of the managerial tasks (Brooks-Young, 2002).

Leadership of change is most effective if the principal is a strong leader, bringing cohesion to groups of educators. Substantive change takes place when the principal is the head of the reform with the support of teachers and other administrators (Marzano, 2003). Effective technology integration requires strong leadership. Teachers can not accomplish substantive change without the financial and moral support of leaders (Sharp, 1998).

Since principals play a crucial role in improving teaching and learning, clearly principals must serve as leaders for student learning. Researchers, educators, and policymakers recognize that good principals are the keystone of good schools (Institute for Educational Leadership, 2000).

When principals demonstrate strong leadership in instruction, student achievement increases. Successful schools have principals that serve as instructional leaders. These principals create a culture for analyzing student achievement data and

promote professional learning communities that provide a coherent program in the school (Fullan, 2002). The principal as instructional leader must be able to do more than sustain change. The principal must be "a sophisticated conceptual thinker who transforms the organization through people and teams" (Fullan, 2002, p. 17). Improving school learning is a challenging task faced by school principals and requiring knowledge, skill, theory, and values (Halverson, 2004). "High achieving schools have strong, competent leaders" (Petzko, 2002, p. 3).

Superintendents, principals, and teachers all recognize the importance of the principal in leadership. In a study of superintendents and principals, researchers randomly chose 3,000 school superintendents and 4,400 K-12 principals to answer a survey. The researchers had a 34% return from the superintendents and a 21% return from the principals. Most of the superintendents felt that a good principal was the key to a successful school (Farkas, Johnson, & Duffet, 2003). Teachers' views of a school and its structure are influenced by the leadership of the principal (Sinden, Hoy, & Sweetland, 2004).

As an instructional leader the principal must have knowledge and skills to support academics in the school; problem solving, effective communication, and risk taking are necessary. "Specifically, this includes skills in observation, analysis, and improvement of teaching, as well as making specific recommendations to improve curriculum and instruction" (Shellard, 2003, p. 1).

Principals act as instructional leaders in effective schools. Sustainable school reform includes integrating technology into the fabric of the school through communication, teaching, assessment, data collection, and accountability (Lezotte &

McKee, 2002). "Simply having educational technology won't necessarily translate into higher student achievement outcomes" (p. 57). The instructional leader expects technology to enhance content. "Good technology with poor content is useless. Good content with poor technology is almost as bad" (p. 59).

When serving as the instructional leader, the principal can see that goals are achieved through monitoring, evaluating, maintaining values, having strong beliefs, and implementation. A significant body of research suggests that leadership, teaching, and adult actions matter; certain leadership actions are linked to improved student achievement; and leadership requires many skills and people in the organization (Reeves, 2006).

Demographic variables are linked to student achievement but the decisions leaders make and the practices of teachers can be more important than the demographic variables. Leaders use inquiry to analyze the underlying causes of deficiencies in student achievement. Leaders must implement school improvement plans continuously to recognize success. The leader must also monitor the implementation and frequency of an initiative for successful improvement. In fact, Reeves (2006) states that "plans without monitoring are little better than wishes upon stars" (p. xxiv).

The leadership role of the principal was examined using a meta-analysis procedure. Marzano, Waters, and McNulty (2005) examined 69 studies in 2,802 schools with approximately 1.4 million students. They found the correlation between the leadership behavior of the principal and the average academic achievement of the students to be 0.25 in a school. This meta-analysis was used to determine what 35 years of research tells about school leadership. "Our meta-analysis of 35 years of research

indicates that school leadership has a substantial effect on student achievement and provides guidance for experienced and aspiring administrators alike" (p. 12). The role of the principal as instructional leader is critical.

Instructional Leader and Cultural Change Agent

Principals who are instructional leaders and cultural change agents have common characteristics: moral purpose, understanding change, improving relationships, knowledge creation and sharing information. Principals with moral purpose work to close the achievement gap between low and high performing students and schools. Understanding change and the process allows principals to encourage teachers to reflect on their own practice compared to current practice. The principal, who is an instructional leader, also seeks resources to assist staff in working together through change. Principals need to build relationships with diverse people to enable all faculty members to become productive members of the school team. The principal leads the way in lifelong learning to encourage teachers to share ideas and improve skills. The principal leads the way to teamwork so that all focus on student learning (Fullan, 2002).

The principal can customize professional development programs to help teachers implement technology effectively into teaching and learning. The leader can also allocate the funding to provide the necessary computers and provide connectivity in the classroom. The leader can also use technology in work and use technology to communicate with the teachers while also providing support for teacher involvement in decision making (Cradler et al., 2002). Leaders can model technology usage to empower teachers and students to learn by doing with technology (CEO Forum, 1999). School

leaders should support policies that provide access to professional development for teachers (Zhao et al., 2002).

Administrators are faced with managing schools and also responding to many other demands. Effective use of technology allows principals to make data driven decisions to meet student needs. Principals effectively using technology define student objectives and performance. Principals also use technology to improve management needs in business practices and communication (CEO Forum, 2001). To provide the effective implementation of technology, school leadership must be effective to make sure that integration of technology is implemented into the curriculum and the fabric of the school (CEO Forum, 2001).

The administrator must make technology decisions based on the needs of the school. One school district in the early 1990s spent $4 million dollars on obsolete computers requiring expensive annual costs for software maintenance. In 1996 another district purchased full computer labs without a master plan or without the infrastructure for installation. The computers remained in a warehouse for most of the year. These cases reveal the need for technology planning and the need for an effective leader to support teaching and learning in a school (Holland, 2000).

Principals have to make informed decisions on hardware and software purchases along with long term planning (Holland, 2000). Strategic planning is important and needed for technology to play a role in teaching and learning in a school. Even if the computers are located in the school, it is not automatic for technology to become a part of the curriculum (Eib & Cox, 2003). With all of these responsibilities, the principal has the opportunity to be the instructional leader as well as cultural change agent in a school.

Transformational Leadership

Transformational change in technology integration requires strong leadership. In a study investigating the technology leadership of high school principals in Texas, analyses of the data revealed that principals scored high on implementing the ISTE NETS-A. Even though principals understood the importance of the standards, the principals scored the lowest combined mean score on leadership and vision for technology (Seay, 2004). Principals need a good understanding of technology and the pedagogy required for integration so that a written vision statement illustrates the strategies employed for success in the school (Todd, 1999).

Willow Bend was selected as a pilot technology school in an effort to improve the under-performing school in 1994. Conyers, Kappel, and Rooney (1999) described the restructuring process of the school. “Recognizing that our vision would entail significant changes in school culture, teaching, and learning, we offered each teacher and staff member the opportunity to transfer. No one chose to leave” (p. 82-83). The staff developed the philosophy, “we use technology to learn, not just learn how to use technology” (p. 83).

The transformation was successful with higher reading scores, higher-quality writing, and the Internet access allowed Willow Bend to use the world as a classroom (Conyers et al., 1999). “Leadership is crucial” (p. 85). The role of the principal was essential to the success of the transformation of the school. “Vision directs all efforts” (p. 85). The school must have clear goals and direct all activities based on these goals. “The administrative staff was clearly part of the support process” (p. 85). The principal

provided advice, respect, and professional development in support of the vision for the school.

Principals played a prominent role as a Bay Area School Reform Collaborative did research on distributive leadership in 16 schools. The data were collected through surveys, interviews, and observations. The researchers examined the role of the principal and noted the importance of the principal in fostering reform, asking questions, exploring data, engaging the faculty in the process of reform, and encouraging faculty. The principals continued "to play prominent roles as catalysts for change, protectors of vision and leaders of inquiry" (Copeland, 2003, p. 391).

Researchers in the United Kingdom studied ten secondary schools to determine successful leadership practices that principals used in schools facing challenging circumstances. The ten schools studied in the in-depth case study had the following criteria: less than 25% of students had grades of A through C, at least 35% of students in the school participated in the free lunch program, and there was evidence of sound leadership practices at the school. The data collection included: interviews, questionnaires, and a rating survey (Harris & Chapman, 2002).

"The demands that schools facing challenging contexts place upon leaders requires them to have a broad range of leadership approaches underpinned by a core set of values and a strong moral purpose. Effective leadership is defined and driven by individual value systems, rather than external demands or managerial concerns" (Harris & Chapman, 2002, p. 6). The successful principals believed it was essential to get the cooperation of others to embrace the values and vision of the school. The vision of the

principals with sound leadership practices was dedicated to the welfare of students and was demonstrated by deeds, words, and direction (Harris & Chapman).

Distributing leadership throughout the school, the principals in the study also set high expectations for students. They created learning opportunities and focused on teaching and learning. Providing and promoting staff development, principals did not tolerate poor teaching. Principals promoted relationships in the school to build a professional learning community focusing on collaboration and commitment. The principals promoted cultural change to improve teaching and learning through providing a clear vision and high expectations (Harris & Chapman, 2002).

The Wallace Foundation funded the Learning from Leadership project as part of their commitment to educational leadership for improving student achievement. The project participants completed an extensive review of the literature on educational leadership and student learning, finding that successful leadership can impact student learning and is highly significant in the role of improving student learning. The school leader sets the direction for the organization. The successful leader sets the direction by articulating a vision, promoting acceptance of group goals, and setting high expectations (Leithwood, Lewis, Anderson, & Wahlstrom, 2004).

Even students recognize the role of the principal in setting the tone and vision for the school. The Pew Internet and American Life Project (Levin & Arafeh, 2002) commissioned the American Institutes for Research to study Internet use by teens across the country. The research was based on using 14 focus groups with gender and racial diversity and voluntary essays submitted online about Internet uses for educational purposes. The study revealed that many schools and teachers were not prepared on to

how to use the Internet effectively in instruction. The students saw a disconnect between how they use the Internet on homework for school and how the Internet is used during the school day under teacher direction. Students saw the disconnect of Internet access as a result of the tone that administrators not teachers set at the school. Students' educational use of the Internet usually took place outside of the school day. Students revealed that teachers and administrators could take a step forward in school improvement by recognizing that a digital divide exists (Levin & Arafeh).

Effective principals foster a culture and climate for continuous improvement and student achievement. These principals continuously work to ensure that vision and values are reflected in the school. "By taking part in staff development with the staff, principals not only model learning, but also send a powerful message about shared responsibility for school improvement" (Shellard, 2003, p. 9).

Bridges (2003) conducted a study to investigate how principals develop and sustain a shared vision for technology. The study looked at the actions and beliefs of principals identified as instructional leaders in technology, the perceptions of teachers regarding the principals' role in technology leadership, and how the technology plan articulated the technology vision at each site. The study included thirty San Diego middle schools and focused on three individual schools for analysis. To sustain a shared vision for technology the principal must hold high expectations, foster teacher buy-in, and be resourceful in providing technology resources. "In addition to these key findings, principals must expect technology to be used, model expectations, evaluate teachers on their technology integration, value teachers' expertise, include everyone in the visioning

process, support risk taking, provide adequate technology resources, and provide teachers adequate time for planning and practice" (p. viii).

Providing Professional Development for Principals

Since schools are changing dramatically, principals are faced with leading in new ways compared to a few years ago. Technology plays an ever-increasing role in education. Principals are expected to lead in this constant atmosphere of change. The principals in these changing schools will have the role of instructional leader, community leader, and visionary leader (Institute for Educational Leadership, 2000).

The National Association of Secondary School Principals refers to the principal of the secondary school as the "instructional artist in residence" (Tirozzi, 2001, 435). The principal:

> establishes a climate for excellence, puts forth a vision for continuous improvement in student performance, promotes excellence in teaching, and commits to sustained, comprehensive professional development for all staff members. The principal ensures that curriculum, instructional strategies, and assessment of student progress are coherent components in the teaching and learning process. In short, the principal engages herself or himself as an instructional leader. (p. 435)

When dealing with technology integration in teaching and learning as a school reform, the key factor for success is administrative support. Targeted administrative training shows concern for improving the technology knowledge of administrators faced with making new digital age decisions. Decisions by districts across the nation point to

the complex professional development needs of administrators since administrative support is the key factor in success (Brooks-Young, 2002).

Technology planning and professional development are critical areas needing principal leadership in making the best choices (Holland, 2000). One of the most important issues in technology integration is effective leadership and many administrators do not have sufficient training to be comfortable (Gibson, 2001). A study of 374 Ohio principals revealed that principals have statistically significant professional development needs in the area of educational technology (Allen, 2003).

Many of the administrative professional development opportunities have focused on skills training and failed to provide the comprehensive professional development needed. “Despite this lack of attention and training administrators are still faced with the increased responsibilities of infusing technology into the schools under their charge” (Schoeny, Heaton, & Washington, 1999, ¶1). Effective integration of technology goes beyond simple acquisition and utilization. “There is much more to it, and principals must know and understand how technology supports learning objectives if they are to evaluate its usefulness in their schools and help teachers determine when and where it is appropriate practice” (Eib, 2001, p. 16).

After studying standards and a review of research Schoeny et al. (1999) made recommendations for technology training for administrators. The recommendations were divided into three main categories including: understanding technology management issues, impact of technology on educational change, and administrative uses of technology (Schoeny et al., 1999). “Training for administrators must include a comprehensive experience with practical applications as well as discussions of pertinent

issues related to the implementation and support of technology. Such training will encourage maximum integration of technology into the daily performance of administrators" (Schoeny et al., 1999, ¶10).

Administrators can influence the success of technology innovation by supporting and providing staff development and mentoring (Zhao et al., 2001). School leaders can customize professional development programs to help teachers implement technology effectively into teaching and learning, as well as allocate the funding to provide the necessary computers and provide connectivity in the classroom. Leaders should use technology in their own work, use technology to communicate with teachers, and provide support for teacher involvement in decision making (Cradler et al., 2002). By modeling effective technology use in their work, school leaders reinforce technology infusion in the classroom (CEO Forum, 1999). School leaders should support policies that provide access to professional development for teachers (Zhao et al., 2002).

Enhancing the Role of the Principal

If administrators understand that technology's integration into the classroom is important, they understand how maximizing its impact on learning can be challenging. Principals should know the learning objectives of the curricula and the technology standards to assist in the integration of technology. Administrators should help "develop a vision and an approach to implementing standards-based learning activities" (Eib, 2001, p. 18).

The Utah State Office of Education's Technology for Principals Leading Utah's Schools (T-Plus) project developed a set of standards in addition to the standards produced by the Technology Standards for School Administrators (TSSA) Collaborative

(*Technology in Schools*, 2002). Principals in the T-Plus project critique learning environments supported by technology that address improvement goals. Principals manage a project team based on technology integration. Principals understand the change process and develop strategies for integrating new technologies. Principals develop an action research project on a technology intervention (*Technology in Schools,* 2002).

Haack (2003) created a study to determine "if there was enhancement of administrators' technology skills in support of teaching and learning, as related to national teacher and administrative technology standards, through the professional development training offered by the Bill and Melinda Gates Foundation State of Nebraska Challenge Grant for Leadership Development in Technology" (p. 3). The study focused on the enhancement of the administrators' technology skills in support of teaching and learning. The study found that participants in the leadership professional development were significantly more positive about their perceptions of their own technology skills. The principals were also more positive about their own abilities to satisfy technology standards than administrators who did not participate (Haack, 2003).

A research study with 1,490 elementary classroom teachers from 96 schools in 22 districts in Massachusetts examined the use of technology with elementary teachers and the school and district organizational elements associated with increases in the use of technology in teaching and learning. The study used multilevel regression techniques to provide evidence that schools' organizational characteristics are associated with teachers' use of technology. "Organizational characteristics such as districts' and schools' leadership practices and emphasis on technology, the type and amount of technology-related professional development available to teachers, as well as the amount of

technology-related restrictive policies in place were found to be associated with the four measures of teachers' use of technology examined in this study" (O'Dwyer, Russell, Bebell, 2004, p. 2). Individual teachers having constructivist beliefs, confidence using technology, and positive beliefs about the efficacy of technology were associated with increased technology usage (O'Dwyer et al.).

Many states are working to improve schools by strengthening leadership. One of the most influential initiatives in this area is the Interstate School Leaders Licensure Consortium (ISLLC). The Council of Chief State School Officers partnered with the National Policy Board for Educational Administration to organize ISLLC. The six ISLLC Standards for School Leaders from the Council of Chief State School Officers (1996) are:

- Standard 1 - A school administrator is an educational leader who promotes the success of all students by facilitating the development, articulation, implementation and stewardship of a vision of learning that is shared and supported by the school community. (p. 10)
- Standard 2 - A school administrator is an educational leader who promotes the success of all students by advocating, nurturing and sustaining a school culture and instructional program conducive to student learning and staff professional growth. (p. 12)
- Standard 3 - A school administrator is an educational leader who promotes the success of all students by ensuring management of the organization, operations and resources for a safe, efficient, and effective learning environment. (p. 14)

- Standard 4 - A school administrator is an educational leader who promotes the success of all students by collaborating with families and community members, responding to diverse community interests and needs, and mobilizing community resources. (p. 16)
- Standard 5 - A school administrator is an educational leader who promotes the success of all students by acting with integrity, fairness and in an ethical manner. (p. 18)
- Standard 6 - A school administrator is an educational leader who promotes the success of all students by understanding, responding to and influencing the larger political, social, economic, legal, and cultural context. (p. 20)

These standards correlate closely with the NETS-A. See Appendix C for a chart showing the relationship of the NETS-A with other standards and studies mentioned in this literature review.

Communication with staff, students, parents, and community members is expected from technology savvy stakeholders. Principals have to take the lead in using technology for communication (Holland, 2000). Supervision and evaluation are necessary skills for principals to make informed decisions on how to support teachers in the effective use of technology in integration strategies in teaching and learning. Effective technology usage is more than operating a computer.

> Knowledge of how to integrate technology into meaningful classroom activities, how to align it with the curriculum standards and how to assure that students are challenged with high order thinking problems are the key to increasing student

achievement…Technology is the tool, but student learning is the ultimate goal. (Holland, 2000, p. 10)

For educators to collaboratively integrate technology, learning must be supported with an emphasis on accessing, interpreting, and synthesizing information. The role of the principal is crucial in integrating technology into the curriculum and the school culture. “The commitment and interest of the principal are the most critical factors for successful implementation of any school innovation-especially technology” (Beavers, 2001, p. 46).

Eib (2001) insists that assessment and evaluation must focus on teaching and learning rather than a checklist of technology skills. Administrators using just a checklist of technology skills could result in fragmentation of the curriculum. Principals should play a supporting role in the teacher’s reflective practice in evaluation of technology skills. The principal might even brainstorm or have a goal-setting session with a teacher about technology integration. This plan should be agreed upon for effective technology integration within the classroom.

Principals should evaluate the current technology in the school and how it is used. The principal can use the teacher’s self-evaluation as well as on-site evaluations observed different days and times. “It is not necessarily how much technology is being used-but how it is being used that matters most” (Eib, 2001, p. 22). Principals must evaluate carefully to get the most out of technology integration in the school. When principals and teachers worked together to plan the focus of technology use in teaching and learning, technology had a positive impact on teaching and learning (Cradler, 2001).

Performance Standards for Principal Leadership

The literature supports the importance of the principal in successful technology implementation. Recognized standards for leaders were defined by the ISLLC standards. The NETS-A provide recognized standards for administrators in technology. The ISTE NETS-A (2002) also provide profiles for technology-literate administrators. Principals who effectively lead the integration of technology typically perform tasks involving: leadership and vision; learning and teaching; productivity and professional practice; support, management, and operations; assessment and evaluation; and social, legal, and ethical issues (ISTE, 2002).

The literature confirms the importance of the role of the principal in successful implementation of technology. ISLLC standards for leadership are recognized by the Interstate School Leaders Licensure Consortium and the NETS-A for technology leadership are available for all administrators. ISTE also provided performance standards with the NETS-A to assist in identifying an effective principal in technology implementation. This study of principals in West Virginia should provide data for decision making. The purpose of this study is to determine how West Virginia principals rate the level of importance of the NETS-A, to determine West Virginia principals' interest in professional development related to the NETS-A, and through qualitative methods to describe the implementation of the NETS-A by West Virginia principals identified as effective technology leaders. The resulting data should provide implications for professional development for principals in West Virginia.

CHAPTER THREE: METHODS

Chapter three provides a description of the research procedures used in this mixed methods study. Creswell (2003) suggests that mixed methods research has come of age in research approaches. Collecting diverse types of data provides a better understanding of the research problem. “A mixed methods design is useful to capture the best of both quantitative and qualitative approaches” (Creswell, p. 22). This chapter includes the description of the study’s research design, population and sample, instrumentation, data collection procedures, and data analyses.

Research Design

This mixed methods study was a “no sequence concurrent study” (Creswell, 2003) with a broad survey in order to generalize results and open-ended interviews to focus on details about principals identified as technology leaders. “When data are collected concurrently, both quantitative and qualitative data are gathered at the same time in the project and the implementation is simultaneous” (p. 212). Implementation for this mixed method of inquiry had equal priority with the integration of the methods taking place at data analysis.

The purpose of this study was to determine how West Virginia principals rate the level of importance of the NETS-A, to determine West Virginia principals’ interest in professional development related to the NETS-A, and through qualitative methods to describe the implementation of the NETS-A by West Virginia principals identified as effective technology leaders. Quantitative data were collected using a researcher designed survey. Qualitative data were collected through face to face or telephone interviews.

Population and Sample

The population for this study was West Virginia principals and assistant principals. The names of participants were taken from the West Virginia Department of Education database for the 2006-2007 school year. The total population of West Virginia principals and assistant principals was 1,148. For the quantitative component, to maintain a confidence level of 95% and a 4.5% margin of error, an appropriate sampling size for the population of 1,148 was 336 (CustomInsight, 1998). To account for an expected return rate of 50%, 673 surveys were mailed. Out of the 673 participants, 410 participants were principals and 263 participants were assistant principals. Of the 673 participants, 425 returned the survey representing a 63% return rate resulting in a 95% confidence level with a 3.8% margin of error or a 99% confidence level with a 5% margin of error.

The sample population in the quantitative component was a stratified sample. Stratified sampling organized the population into the homogeneous subsets of principals and assistant principals and allowed selection of the appropriate number from each group (Babbie, 1990). The stratified sample was selected with a random start.

The sample population for the qualitative inquiry was taken from recommendations by the West Virginia Department of Education and the Regional Education Service Agencies. Leaders in the West Virginia Department of Education and the Regional Education Service agencies were asked to provide names of West Virginia principals recognized as effective technology leaders. The design was a purposeful and single-stage sampling. A single-stage sampling procedure was used since the researcher had access to names in the population and could sample the people directly (Creswell, 2003). The purposeful sampling allowed for the selection of participants identified as

effective technology leaders and included a small number of cases (Bailey, 2007). The number of interviews (14) was determined by the researcher when the dimensions of the data and the emergent themes were exhausted. The decision to stop the interviews was based on this point of "theoretical saturation" (Bogdan & Biklen, 2003, p. 67).

Instrumentation

The quantitative data in this study were collected using a researcher-developed self-reporting survey. Items related to the importance of the six standards of the NETS-A used a 7-point Likert scale. "The particular value of this format is the unambiguous ordinality of the response categories" (Babbie, 1990, p. 164). The Likert scale provided a straightforward method of index construction (Babbie). This portion of the *Survey of Technology Experiences* (Appendix B) consisted of 18 close-ended items developed from the standards of leadership and vision; learning and teaching; productivity and professional practice; support, management, and operations; assessment and evaluation; and social, legal, and ethical issues. The performance profile for technology-literate principals (Appendix D) from the NETS-A was used as a reference in question construction for the survey. Principals were asked to rate the level of importance for each statement in relation to the role of the principalship. The level of importance of the items from the six standards of the NETS-A had responses on a scale from 1 to 7 with 1 = "Not important", 4 = "Important" and 7 = "Very Important". Three questions were developed for each of the six standards for a total of 18 items. Additional items on the survey related to interest in professional development. Respondents had the option of answering "yes" or "no" when asked about interest in professional development for each of the 18 items taken from the six standards of the NETS-A. Demographic data were also collected

including: administrative role, grade levels in school, recent technology related professional development, home computer use, participation in online courses, and years experience in education.

Survey respondents were ensured confidentiality. As suggested by Fowler (2002) a simple identifying number was included on the questionnaire for the purpose of recontacting nonrespondents. The identifying number was explained in the cover letter.

According to Alreck & Settle (1995) validity exists when a measurement of any kind measures all of what it is supposed to measure and only that. The measurement must be free of extraneous factors and bias. Since the instrument was developed by the researcher, a panel of experts (Appendix E) was asked to review the survey and determine validity. Dillman (1978) provided a series of questions that were asked about each item included in the study. Each member of the panel was asked to use the questions provided in Appendix F to assure content validity.

The qualitative component was comprised of interviews targeting the technology leaders identified by the West Virginia Department of Education and the Regional Education Service Agencies. The face to face or telephone interviews were semistructured. “In a semistructured interview, the interviewer uses an interview guide with specific questions that are organized by topics but are not necessarily asked in a specified order” (Bailey, 2007, p. 100). This interview protocol allowed the researcher flexibility to ask probing questions as well as follow-up questions as emergent themes appeared. Interview questions are listed in Appendix G.

The researcher took extensive field notes and communicated in detail the procedures used in the field to establish validity or trustworthiness. “The researcher

achieves internal validity when he or she produces an accurate representation of the setting" (Bailey, 2007, p. 181). Member checks as well as peer and expert reviews were conducted to increase the validity and trustworthiness of the research. Bailey also suggests member checking and peer and expert reviews are important research techniques for enhancing validity.

Data Collection Procedures

Dillman (2000) explains the Tailored Designed Method for achieving high response rates from a survey. This method includes respondent-friendly questionnaires, up to five contacts with the respondent, stamped return envelopes, personal correspondence, and a token financial incentive (Dillman). The data collection procedures for this study included four of the five methods. Since multiple contacts are important for maximizing response to mailed surveys, three contacts by first class mail and an additional special contact were planned. The first packet included a brief cover letter, one copy of the *Survey of Technology Experiences* with directions for completion, and an addressed and stamped reply envelope. The cover letter (Appendix H) followed Dillman's (1978) design. The first paragraph explained what the study was about and the importance of the study. The second paragraph assured the respondent that his or her response was important and explained how the respondent was selected. The third paragraph promised confidentiality, explained approval by the Marshall University Institutional Review Board from the Office of Research Integrity, and explained the identifying number on the survey as a method to send follow-up surveys to nonresponders. The fourth paragraph re-emphasized the basic justification for the study and offered respondents the opportunity to receive additional information about the study.

Respondents who wanted information were asked to put their name and address on the back of the return envelope. Having respondents put the address on the envelope and not the survey, helped reinforce the promise of confidentiality. Respondents were asked to complete the survey and return it within two weeks.

Returned surveys were tracked with a return rate graph. Each returned survey was logged on a graph illustrating the number of surveys returned each day. A reminder (Appendix I) was sent a few days after the initial questionnaire mailing to convey a sense of importance for returning the survey (Dillman, 1978). A replacement questionnaire with cover letter (Appendix J) was planned, but not sent two weeks after the first questionnaire, since the needed responses were received. The special contact was not made by telephone since additional responses were not needed.

Qualitative data were collected through semistructured interviews. These semistructured interviews were scheduled in advance to allow enough time for the interviewer to engage in dialogue as well as ask questions (Bailey, 2007). Each subject was contacted by telephone to request an interview. Interviews were conducted face to face or by telephone. Participants were promised confidentiality. With the permission of the participant, interviews were recorded to allow for better collection of data. Data were transcribed from recordings and coded. “Data reduction, simplification, lies at the heart of coding” (p. 127). Memoing was also used in conjunction with the coding process. The memoing process allowed the researcher to create, define, and refine conceptual categories for understanding (Bailey).

Data Analysis

Quantitative data were analyzed using descriptive statistics and other appropriate statistical analyses. The data were analyzed to determine how West Virginia principals rate the level of importance of the NETS-A and to determine West Virginia principals' interest in professional development related to the NETS-A. Ancillary findings based on demographic information were reported where significant.

Finally, the qualitative data were analyzed and interpreted. "By data analysis we mean the process of systematically searching and arranging the interview transcripts, fieldnotes, and other materials that you accumulate to enable you to come up with findings" (Bogdan & Biklen, 2003, p. 147). The data interpretation involved explaining and framing the ideas in relation to the literature, as well as showing why the findings are important (Bogdan & Biklen). Emergent themes were used to organize the data. "A good qualitative paper is well documented with description taken from the data to illustrate and substantiate the assertions made" (p. 193). Triangulation of data was used to support the assertions made and the integrity of the inferences made. Results of the interviews, results of the surveys, and school technology integration were compared to support the inferences made. "The central point of the procedure is to examine a conclusion from more than one vantage point" (Schwandt, 2001, p. 257). The qualitative data were reported using cross case analysis to describe the implementation of the NETS-A by West Virginia principals identified as effective technology leaders.

Summary

This mixed methods study used qualitative and quantitative methods. This combination of research strategies should not be considered a mutually exclusive

dichotomy but should provide a continuum within the systematic inquiry to produce more complete or useful information from the study (Borland, 2001). The methods were designed to determine how West Virginia principals rate the level of importance of the NETS-A, to determine West Virginia principals' interest in professional development related to the NETS-A, and through qualitative methods to describe the implementation of the NETS-A by West Virginia principals identified as effective technology leaders. The documentation from the Marshall University Institutional Review Board Office of Research Integrity is located in Appendix K.

CHAPTER FOUR: FINDINGS

Chapter four presents findings of this mixed methods study including statistical analyses and narrative description. An in-depth review of the literature indicated the importance of the role of the principal as the leader in change, as the technology leader in a school, and as the instructional leader of the school. The review of the literature also revealed the professional development needs of principals pertaining to technology integration in the school. The National Educational Technology Standards for Administrators (NETS-A) provide a consensus from educational stakeholders of what effective technology leadership looks like in schools. The purpose of the study was threefold:

- to determine how West Virginia principals rate the level of importance of the NETS-A,
- to determine West Virginia principals' interest in professional development related to the NETS-A,
- and through qualitative methods to describe the implementation of the NETS-A by West Virginia principals identified as effective technology leaders.

The following twelve research questions were used to determine the level of importance of the NETS-A as indicated by West Virginia principals and their interest in professional development related to the NETS-A.

1. How important do West Virginia principals rate the NETS-A related to Standard I, leadership and vision, to the job of the principalship?
2. Are West Virginia principals interested in professional development in the NETS-A related to Standard I, leadership and vision?

3. How important do West Virginia principals rate the NETS-A related to Standard II, learning and teaching, to the job of the principalship?
4. Are West Virginia principals interested in professional development in the NETS-A related to Standard II, learning and teaching?
5. How important do West Virginia principals rate the NETS-A related to Standard III, productivity and professional practice, to the job of the principalship?
6. Are West Virginia principals interested in professional development in the NETS-A related to Standard III, productivity and professional practice?
7. How important do West Virginia principals rate the NETS-A related to Standard IV, support, management, and operations, to the job of the principalship?
8. Are West Virginia principals interested in professional development in the NETS-A related to Standard IV, support, management, and operations?
9. How important do West Virginia principals rate the NETS-A related to Standard V, assessment and evaluation, to the job of the principalship?
10. Are West Virginia principals interested in professional development in the NETS-A related to Standard V, assessment and evaluation?
11. How important do West Virginia principals rate the NETS-A related to Standard VI, social, legal, and ethical issues, to the job of the principalship?
12. Are West Virginia principals interested in professional development in the NETS-A related to Standard VI, social, legal, and ethical issues?

The researcher-designed, *Survey of Technology Experiences* (Appendix B); included eighteen technology related statements with a 7-point Likert scale indicating the level of importance to the role of principal. Principals were asked to indicate their interest

in professional development for each of the eighteen technology related statements. The instrument also included six questions to gather demographic data. Descriptive statistics and tests of significance were used to analyze the data.

The study used qualitative methods to describe the implementation of these standards by West Virginia principals identified as effective technology leaders by either the West Virginia Department of Education or the Regional Education Service Agencies. A sample of recommended principals was interviewed until the interviewer reached theoretical saturation. Data were reported using cross case analysis.

Population and Sample

The population of this study consisted of 1,148 West Virginia principals. A sample size of 673 was selected to get a 50% return rate of 336 for a 95% confidence level with a 4.5% margin of error. The stratified random sample was provided by the West Virginia Department of Education database of 2006-2007 principals and assistant principals. Of the 673 principals randomly selected to participate in the study, 425 returned the *Survey of Technology Experiences* on the first mailing, representing 63% of the sample population. The large return of surveys resulted in a 95% confidence level with a 3.8% margin of error or a 99% confidence level with a 5% margin of error. A second mailing was planned but not needed.

Of the 425 participants, 260 respondents (61.2%) served as principals and 150 respondents (35.3%) served as assistant principals. Of the original stratified sample, 410 (60.9%) were principals and 263 (39.1%) were assistant principals. The percentage of returned surveys is proportional to the original stratification. Table 1 provides descriptive analysis of respondent roles in education.

Table 1: Frequency of Role in Education Reported by Participants

		Frequency	Percent
Valid	Neither	11	2.6
	Assistant Principal	150	35.3
	Principal	260	61.2
	Total	421	99.1
Missing	System	4	.9
Total		425	100.0

The West Virginia Department of Education and the Regional Education Service Agencies recommended names of principals recognized as effective technology leaders. From this list, 14 principals representing each geographic region of the state, various grade levels, and males/females were interviewed (Appendix L). Five of the principals were interviewed face to face and the remaining nine were interviewed via telephone. With permission from the principals, interviews were recorded.

Major Findings

This section presents major findings organized to correspond with each research question. All research questions were answered by utilizing the survey instrument, the *Survey of Technology Experiences.* The qualitative component of the study provided a description of activities related to technology leadership of West Virginia principals recognized as effective technology leaders.

The survey contained eighteen statements with two parts for each statement. Each of the six standards of the NETS-A was represented by three statements. Part A of each statement asked participants to rate the level of importance the statement was to the role of the principalship. Part B asked participants to indicate if they were interested in

professional development in this topic. Table 2 provides a descriptive display of the research questions and survey items used to represent each.

Table 2: Survey Statements Representative of Research Questions

	Research Questions	Statements (Numbered Order)		
1.	How important do West Virginia principals rate the NETS-A related to Standard I, leadership and vision, to the job of the principalship?	1A	2A	3A
2.	Are West Virginia principals interested in professional development in the NETS-A related to Standard I, leadership and vision?	1B	2B	3B
3.	How important do West Virginia principals rate the NETS-A related to Standard II, learning and teaching, to the job of the principalship?	4A	5A	6A
4.	Are West Virginia principals interested in professional development in the NETS-A related to Standard II, learning and teaching?	4B	5B	6B
5.	How important do West Virginia principals rate the NETS-A related to Standard III, productivity and professional practice, to the job of the principalship?	7A	8A	9A
6.	Are West Virginia principals interested in professional development in the NETS-A related to Standard III, productivity and professional practice?	7B	8B	9B
7.	How important do West Virginia principals rate the NETS-A related to Standard IV, support, management, and operations, to the job of the principalship?	10A	11A	12A
8.	Are West Virginia principals interested in professional development in the NETS-A related to Standard IV, support, management, and operations?	10B	11B	12B
9.	How important do West Virginia principals rate the NETS-A related to Standard V, assessment and evaluation, to the job of the principalship?	13A	14A	15A
10.	Are West Virginia principals interested in professional development in the NETS-A related to Standard V, assessment and evaluation?	13B	14B	15B
11.	How important do West Virginia principals rate the NETS-A related to Standard VI, social, legal, and ethical issues, to the job of the principalship?	16A	17A	18A
12.	Are West Virginia principals interested in professional development in the NETS-A related to Standard VI, social, legal, and ethical issues?	16B	17B	18B

The *Survey of Technology Experiences* utilized a Likert scale to obtain principals' perceptions of the level of importance of technology statements based on the NETS-A. The seven point Likert scale was as follows: 1 = "Not Important – I do not think this is important at all to the job of the principal"; 4 = "Important"; and 7 = "Very Important – I

think this is essential for a principal as an instructional leader". The *Survey of Technology Experiences* also used a yes or no response to determine principals' interest in professional development for each of the technology statements based on the NETS-A.

The data were analyzed using SPSS 13.0. The mean score was calculated for each statement that used the Likert scale. To arrive at the mean for Standard I, SPSS 13.0 was used to perform a summation of scores from statements 1, 2, and 3 to derive a mean score. For example, in Table 2, calculations were performed on statements 1A, 2A, and 3A to determine the mean for Standard I and answer research question 1. The mean scores for all standards were used to answer research questions one, three, five, seven, nine, and eleven.

Frequencies were calculated for each professional development statement. Then SPSS 13.0 was used to perform a summation of the frequencies for the three statements representing each standard. For example, in Table 2, calculations were performed on statements 1B, 2B, and 3B to determine frequencies for interest in professional development for Standard I and answer research question 2. The frequencies were used to answer research questions two, four, six, eight, ten, and twelve. The following sections exhibit the major findings of the study through analyses of each research question.

Research Question One: How important do West Virginia principals rate the NETS-A related to Standard I, leadership and vision, to the job of the principalship?

Participants were asked to rate the level of importance statements were to the role of the principalship by indicating a number on the Likert scale that was most representative of their perceptions. With 423 responses for each, statement one had a mean score of 5.69, statement two had a mean score of 5.89, and statement three had a

mean score of 6.10. Table 3 shows the mean scores and standard deviations for each of the three statements representing leadership and vision.

Table 3: Standard I - Descriptive Data for Individual Statements

Statements: I believe that a principal should:	N	Mean	Std. Deviation
1. participate in a district wide process for developing a shared vision for technology use.	423	5.69	1.388
2. work with staff to develop a technology-rich school improvement plan grounded in research.	423	5.89	1.210
3. support a strong technology committee within the school.	423	6.10	1.144

To arrive at the mean for Standard I, SPSS 13.0 was used to perform a summation of scores from questions 1, 2, and 3 to derive a mean of 5.90. Table 4 presents the mean score and standard deviation for Standard I, leadership and vision.

Table 4: Standard I - Leadership and Vision

Statements: I believe that a principal should:	N	Mean	Std. Deviation
Standard I, leadership and vision	420	5.90	1.094

The Likert scale indicated that a score of 4 was considered important to the role of the principal. The Likert scale indicated that a score of 7 was considered very important or essential for a principal as an instructional leader. The mean score for Standard I, leadership and vision, was 5.90 which could be considered high importance for a principal as an instructional leader. Seven was the most frequently selected response across the three survey statements for Standard I.

While survey items asked principals to identify the level of importance of leadership and vision specifically related to participation in district wide planning, developing a technology rich school and supporting a school based technology committee, interviews with principals provided further insight and examples of

technology leadership in West Virginia schools. Each of the interviewees cited a vision for the school to move forward in technology usage. One theme that emerged was that technology was not a separate strand in the school but part of everything that they did. Principals were visionary and acted as the catalyst for improving technology in the school. The nature of the visions was varied and included such topics as: using technology to become more interactive with parents, making sure that students have the opportunity to access all online resources through technology, making computers available in community locations for student and parent access, providing distance learning in the school, and providing adequate access and professional development. One principal stated, "Technology use is a state of mind."

Several principals promoted their visions of using technology in new ways including the use of handheld computers, iPods, student responder systems, and whiteboards by providing these tools and professional development in the school so that teachers could use them. One principal hopes to someday issue textbooks on CD so that students could simply carry a backpack, laptop computer, and books on CDs. One middle school principal promoted incorporating new technologies in the school and said, "We are at the point now that teachers are looking for new technologies to use."

One principal plans strategically how to move the teachers forward in using technology. For example, iPods were purchased for every teacher in the school. They next purchased audio books that were teacher related to get the teachers using the technology. Then they moved to a book study with the entire staff having the book on the iPod. Now teachers in this school are starting to record their lessons on iPods so that

students can have access to the recordings at the school. According to the principal, the next step is to make the recordings available on their website.

One of the principals purchased two sets of student responders for the teachers to use in the classrooms. The teachers had no idea what the principal was talking about when told they would get the student responders. The principal provided professional development for the teachers. When the principal visited the classroom the sixth grade students jumped up and clapped because they loved using the responders so much. They wanted to say thank you to the principal.

All of the principals indicated a school technology plan was in place. The principals played different roles in the development of the plan. All of the interviewees indicated the presence of a technology committee which participated in the development of the plan. The sizes of the committee varied but most indicated that at least one staff member with technology expertise was on the committee. Committees included some of the following: staff members, system operators, community members, students, county representatives, and technology mentors.

Several principals spoke directly about analyzing data for the school to make decisions on the technology plan. Several principals had a technology survey completed by the teachers at the school to determine needs. Some asked staff to prioritize needs for the school's technology plan. Several mentioned using data to make decisions based on student needs. One elementary principal spoke about the team saying, "They have taken ownership of this new plan." Another principal said, "I was personally and hands-on involved in the school plan. We have a management team and technology was one of our

school wide goals." Several principals indicated that they met with these committees on a regular basis in the school.

Participation in a county wide plan was limited among the principals. Most indicated that they had an indirect role in the county plan since the school plan was part of the county plan. Some principals answered questions about school needs as a way of participating on the county plan. Of the fourteen principals interviewed, one indicated a role of advisor for the county technology plan.

Research Question Two: Are West Virginia principals interested in professional development in the NETS-A related to Standard I, leadership and vision?

Participants were asked if they were interested in professional development for each of the statements related to Standard I, leadership and vision, by answering yes or no. Of 368 respondents, 213 (50.1%) are interested in professional development for statement one. Of 366 respondents, 240 (56.5%) are interested in professional development for statement two. Of the 356 respondents, 187 (44.0%) are interested in professional development in statement three. Table 5 presents the frequency distribution for professional development in statements one, two, and three.

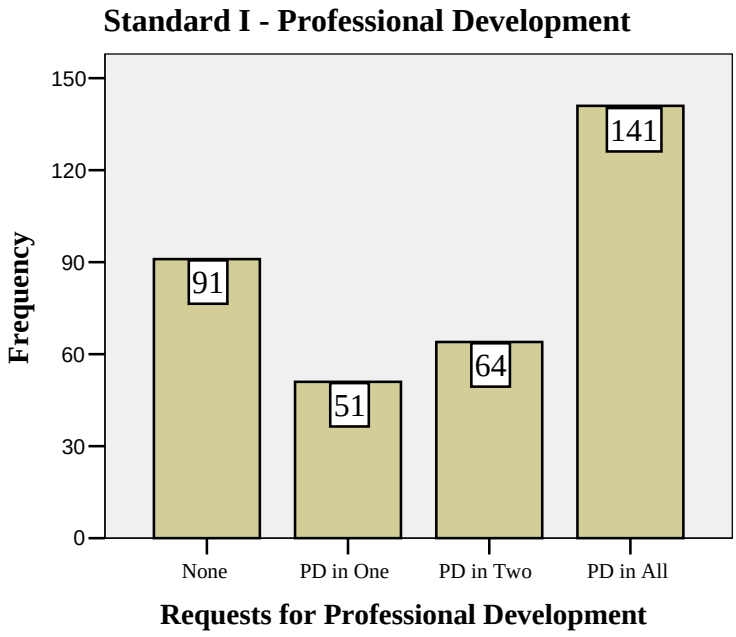
Table 5: Standard I - Frequency Distribution for Professional Development

Professional Development	Number of Respondents	Yes Frequency	Percent
1. participate in a district wide process for developing a shared vision for technology use.	368	213	50.1
2. work with staff to develop a technology-rich school improvement plan grounded in research.	366	240	56.5
3. support a strong technology committee within the school.	356	187	44.0

Figure 1 presents the summative frequency distribution for professional development in Standard I. Of the 425 participants, 51 respondents (12.0%) are interested

in professional development in one of the statements related to Standard I; 64 respondents (15.1%) are interested in professional development in two statements related to Standard I; and 141 respondents (33.2%) are interested in professional development in all three statements related to Standard I. In response to research question two, of the 425 participants, 256 respondents (60.3%) are interested in some level of professional development pertaining to Standard I, leadership and vision.

Figure 1: Standard I – Interest in Professional Development



Research Question Three: How important do West Virginia principals rate the NETS-A related to Standard II, learning and teaching, to the job of the principalship?

Participants were asked to rate the level of importance statements were to the role of the principalship by indicating a number on the Likert scale that was most representative of their perceptions. With 424 responses, statement four had a mean score of 6.33; with 423 responses each, statement five had a mean score of 6.32 and statement six had a mean score of 6.11. Table 6 shows the mean scores and standard deviations for each of the three statements representing learning and teaching.

Table 6: Standard II - Descriptive Data for Individual Statements

Statements: I believe that a principal should:	N	Mean	Std. Deviation
4. promote effective practices in technology integration to improve instruction.	424	6.33	.948
5. provide teachers with technology to design, assess, and modify student instruction.	423	6.32	1.007
6. participate in professional development with instructional staff for effective technology integration.	423	6.11	1.112

To arrive at the mean for Standard II, SPSS 13.0 was used to perform a summation of scores from questions 4, 5, and 6 to derive a mean of 6.26. Table 7 presents the mean score and the standard deviation for Standard II, learning and teaching.

Table 7: Standard II - Learning and Teaching

Statements: I believe that a principal should:	N	Mean	Std. Deviation
Standard II, learning and teaching	420	6.26	.895

The Likert scale indicated that a score of 4 was considered important to the role of the principal. The Likert scale indicated that a score of 7 was considered very important or essential for a principal as an instructional leader. The mean score for Standard II, learning and teaching, was 6.26 which could be considered of high importance for a principal as an instructional leader. Seven was the most frequently selected response across the three survey statements for Standard II.

While survey items asked principals to identify the level of importance of learning and teaching specifically related to promoting technology integration, providing technology to assess and modify student instruction, and participation in professional development with staff for technology integration, interviews with principals provided further insight and examples of technology leadership in West Virginia schools. During the interview process, principals expressed a wide range of answers when asked about

technology integration in teaching and learning. The answers ranged from listing technology tools to citing specific examples of what they call technology integration. This section includes descriptions and specific examples from principals interviewed.

When asked about what children would be doing if the teacher is effectively integrating technology, several principals indicated that students would be using the computer labs or rotating through computer stations. One principal stated that students would be engaged and excited. Another principal described the following, “I am not looking for technology just being used, I am looking for ways that it is used to improve the instructional process, to make information available that would not be available.” One high school principal said, “I am not looking for just the teacher using the technology and the students just writing on paper. The kids need to have their hands on the technology.”

For effective technology integration, multiple principals mentioned students working on computer programs or accessing computer resources including: Compass Learning, Odyssey, Accelerated Reader, Accelerated Mathematics, Marco Polo, and United Streaming. Other principals mentioned students using productivity tools including: word processing, presentation software, and spreadsheets. One principal told about second graders making PowerPoints to take home and show parents. The following statement illustrates the varying ideas that different people have for technology integration within the group of principals interviewed. “Some people think they integrated technology because they typed on the word processor and saved to the hard drive. If that is their idea of using technology, they haven’t even come close. You just used a different typewriter.”

One elementary principal stated that teachers focus on technology standards in teaching and learning in the school. For effective teaching and learning, several principals talked about teachers using data projectors in the classroom, while more than one-half included teachers using the interactive whiteboard during classroom instruction.

Other principals provided these examples of what students might be doing if the teacher was effectively integrating technology:

- Using science probes on a handheld computer
- Using an iPod to assist in reading for a special education student
- Writing a digital story
- Working online on a digital newspaper
- Working online on the school yearbook
- Updating the school website
- Communicating with people from around the world
- Working in a group to research a problem and find a solution
- Enhancing writing with images and graphs
- Enhancing mathematics with technology applications
- Achieving certification in Microsoft
- Creating graphs in science to explain findings
- Enhancing a presentation with sound, animation, and images

To encourage teachers to use technology, one elementary principal said that teachers were required to incorporate at least one technology project per year with the students so that the students in the school would have at least four technology projects per year. The goal was not to just use a computer but to do research and presentations to

meet the school goals. The principal talked about students using technology to design solutions for real world problems. “The technology is the tool but not the goal itself, the same thing as in a lesson. It is based on student learning and student outcomes.”

At least one-half of the principals interviewed talked about teachers incorporating technology to make data based decisions for instruction. Teachers used handheld computer technology for formative assessments like DIBELS and accessing data to improve instruction. Other principals talked about using student response systems for benchmarking and for making data based decisions about instruction.

Principals also talked about promoting and participating in professional development with teachers for technology integration. More than half of the principals participated in professional development for using interactive whiteboards in their schools. Several talked about teachers sharing ideas on how to effectively use the boards. One principal talked about visiting a classroom where students were demonstrating understanding vocabulary words on the whiteboard. “When I see poor teaching, I see teachers just saying something like look up something like malaria. That is poor instruction. The teacher has to focus and provide a way to engage the student in investigation.”

All principals talked about the importance of professional development in helping teachers effectively integrate technology into the classroom. One principal stated that next year the school would have a full time technology person on staff to work with the teachers on technology integration and site based professional development. Multiple principals talked about the value of technology teachers or technology mentors in the school for providing professional development. Several principals actually led

professional development in their schools. Topics included: productivity tools, Google tools, email, and technology integration. To assist in promoting professional development, one principal talked about regularly providing substitutes so that teachers could participate in site based technology related professional development.

In talking about the direction for the school in technology integration one principal stated the following:

> I want to see students online working more independently. Things are so controlled. I want to see more application, open-ended learning with problem based learning, not just a tool for teachers to show or do. They need to go online, find information, and complete a task. I want to see problem based learning and have them present to peers. We need to get them to work in groups, collaborate, and have them present an argument or position.

The principals interviewed provided a variety of examples illustrating technology integration. The descriptions from these principals represent a wide diversity of answers. However, all principals agreed on the importance of professional development in promoting effective practices in technology integration as well as the importance of providing the necessary technology to improve instruction.

Research Question Four: Are West Virginia principals interested in professional development in the NETS-A related to Standard II, learning and teaching?

Participants were asked if they were interested in professional development for each of the statements related to Standard II, learning and teaching, by answering yes or no. Of the 369 respondents, 296 (69.6%) are interested in professional development for statement four. Of the 358 respondents, 278 (65.4%) are interested in professional

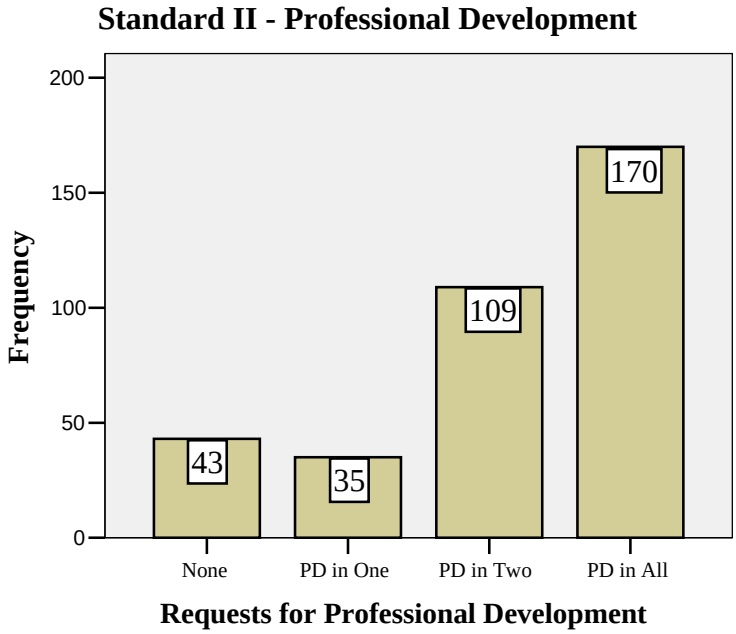
development in statement five. Of the 367 respondents, 282 (66.4%) are interested in professional development in statement six. Table 8 presents the frequency distribution for professional development in statements four, five, and six.

Table 8: Standard II - Frequency Distribution for Professional Development

Professional Development	Number of Respondents	Yes Frequency	Percent
4. promote effective practices in technology integration to improve instruction.	369	296	69.6
5. provide teachers with technology to design, assess, and modify student instruction.	358	278	65.4
6. participate in professional development with instructional staff for effective technology integration.	367	282	66.4

Figure 2 presents the summative frequency distribution for professional development in Standard II. Of the 425 participants, 35 respondents (8.2%) are interested in professional development in one statement related to Standard II; 109 respondents (25.6%) are interested in professional development in two statements related to Standard II; and 170 respondents (40.0%) are interested in professional development in all three statements related to Standard II. In response to research question four, of the 425 participants, 314 respondents (73.8%) are interested in some level of professional development pertaining to Standard II, learning and teaching.

Figure 2: Standard II – Interest in Professional Development



Research Question Five: How important do West Virginia principals rate the NETS-A related to Standard III, productivity and professional practice, to the job of the principalship?

Participants were asked to rate the level of importance statements were to the role of the principalship by indicating a number on the Likert scale that was most representative of their perceptions. With 425, 424, and 423 responses respectively, statement seven had a mean score of 6.12, statement eight had a mean score of 6.05, and statement nine had a mean score of 5.80. Table 9 shows the mean scores and standard deviations for each of the three statements pertaining to productivity and professional practice.

Table 9: Standard III - Descriptive Data for Individual Statements

Statements: I believe that a principal should:	N	Mean	Std. Deviation
7. use current technology-based management systems to maintain personnel and student records.	425	6.12	1.128
8. use email to communicate with at least two groups of stakeholders: teachers, parents, community, or peers.	424	6.05	1.282
9. use telecommunications and/or the school website to communicate and collaborate with others.	423	5.80	1.343

To arrive at the mean for Standard III, SPSS 13.0 was used to perform a summation of scores from questions 7, 8, and 9 to derive a mean of 5.99. Table 10 presents the mean score and standard deviation for Standard III, productivity and professional practice.

Table 10: Standard III - Productivity and Professional Practice

Statements: I believe that a principal should:	N	Mean	Std. Deviation
Standard III, productivity and professional practice	422	5.99	1.038

The Likert scale indicated that a score of 4 was considered important to the role of the principal. The Likert scale indicated that a score of 7 was considered very important or essential for a principal as an instructional leader. The mean score for Standard III, productivity and professional practice, was 5.99 which could be considered of high importance to the role of the principal as instructional leader. Seven was the most frequently selected response across the three survey statements for Standard III.

While survey items asked principals to identify the level of importance of productivity and professional practice specifically related to using technology-based management systems, using email to communicate with stakeholders, and using telecommunications and the school website to communicate, interviews with principals provided further insight and examples of technology leadership in West Virginia schools.

Every principal interviewed starts the school day by turning on the computer. They immediately perform several technology based professional activities including: checking and responding to email, checking technology based teacher attendance and substitute lists, and checking the West Virginia Education Information System (WVEIS). In addition, many of the principals also synchronize Palm handheld computers and pocket computers, open computer based calendars and open electronic based task lists.

Every principal indicated using the state technology-based management system to maintain personnel and student records. Almost one-half of the principals specifically mentioned teachers using an electronic grade book and uploading the grades to the state information system. In addition, several principals indicated that teachers in the school use Palm handheld computers to maintain grades.

A variety of additional technology-based systems were used to promote the principals' productivity. Several of the principals used Palm handheld computers in the observation and evaluation process for personnel. Principals also use Palms or pocket personal computers for classroom walkthroughs for data collection. Some of the principals have student schedules, pictures, locker combinations, and other student information on Palm handheld computers so they can access the data from anywhere.

Every principal interviewed indicated using email for communication with multiple stakeholders. Principals indicated communicating with staff daily through email. Many stated that email was the main mode of staff communication while some indicated it was required. Several principals indicated having separate listservs for different departments in the school or for the entire staff, with one principal maintaining a listserv for parents. Email replaced all paper memos at some schools. For example, teachers

email lunch counts to the cook with the number of lunches in the subject line, all school announcements are emailed, and teachers email the principals as well. Several principals talked about creating the expectation of using email. “This is a techno friendly school. The first thing to do as a principal is to bring the staff on board with email and when you get that in place, it is an easy leap to other technology projects.”

In addition to communicating with staff members by email, principals named other specific groups that they email including: county board offices, parents, business partners, community members, West Virginia Department of Education, Regional Education Service Agencies, large groups, and individuals. Principals indicated that communication through email “saves time, paper, and is more efficient.”

Principals also indicated using a school website for communication with multiple stakeholders. Calendars were kept to provide current information about school events. At some schools, parents and students had secure logins to check current student grades online. Lesson plans and resources were also available for parents and students online. Several principals required teachers to maintain the updated information available online including lesson plans and grades for parents and students to access.

Two of the fourteen principals have telecommunication systems allowing for sending and receiving distance learning and for communicating and collaborating with others anywhere. Another principal shared the goal of getting involved in distance learning to meet the different needs of students in the school. Other forms of communication including blogs and technology based call systems are used by principals.

Research Question Six: Are West Virginia principals interested in professional development in the NETS-A related to Standard III, productivity and professional practice?

Participants were asked if they were interested in professional development for each of the statements related to Standard III, productivity and professional practice, by answering yes or no. Of 364 respondents, 213 (50.1%) are interested in professional development for statement seven and 170 (40.0%) are interested in professional development in statement eight. Of 363 respondents, 188 (44.2%) are interested in professional development in statement nine. Table 11 presents the frequency distribution for professional development in statements seven, eight, and nine.

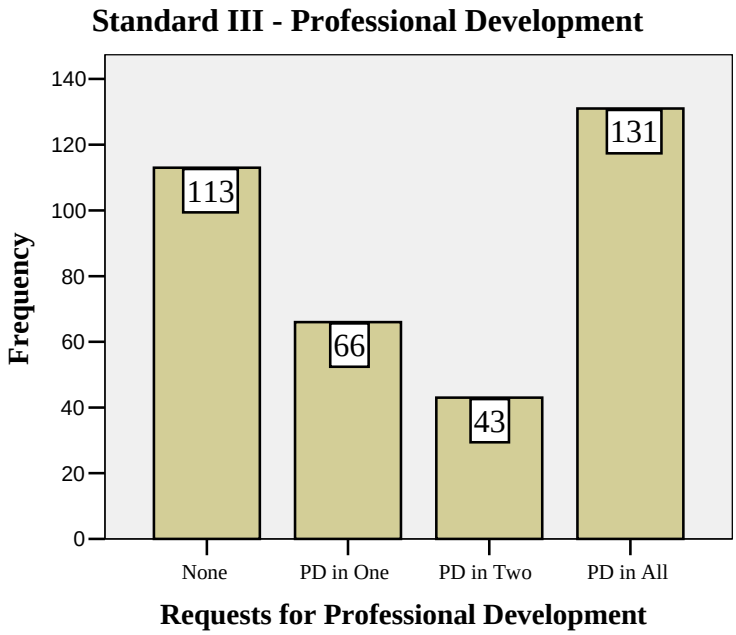
Table 11: Standard III - Frequency Distribution for Professional Development

Professional Development	Number of Respondents	Yes Frequency	Percent
7. use current technology-based management systems to maintain personnel and student records.	364	213	50.1
8. use email to communicate with at least two groups of stakeholders: teachers, parents, community, or peers.	364	170	40.0
9. use telecommunications and/or the school website to communicate and collaborate with others.	363	188	44.2

Figure 3 presents the summative frequency distribution for professional development in Standard III. Of 425 participants, 66 respondents (15.5%) are interested in professional development in one statement related to Standard III, productivity and professional practice; 43 respondents (10.1%) are interested in professional development in two statements related to Standard III; and 131 respondents (30.8%) are interested in professional development in all three statements related to Standard III. In response to research question six, of the 425 participants, 240 respondents (56.4%) are interested in

some level of professional development pertaining to Standard III, productivity and professional practice.

Figure 3: Standard III – Interest in Professional Development



Research Question Seven: How important do West Virginia principals rate the NETS-A related to Standard IV, support, management, and operations, to the job of the principalship?

Participants were asked to rate the level of importance statements were to the role of the principalship by indicating a number on the Likert scale that was most representative of their perceptions. With 423 responses, statement ten had a mean score of 6.05 and statement eleven had a mean score of 5.82. With 421 responses, statement twelve had a mean score of 6.12. Table 12 shows the mean scores and standard deviations for each of the three statements representing support, management, and operations.

Table 12: Standard IV - Descriptive Data for Individual Statements

	Statements: I believe that a principal should:	N	Mean	Std. Deviation
10.	provide school-wide technology professional development for sharing ideas and resources.	423	6.05	1.095
11.	allocate discretionary funds and resources to advance implementation of the school technology plan.	423	5.82	1.192
12.	advocate for adequate, timely, and high-quality technology support services.	421	6.12	1.117

To arrive at the mean for Standard IV, SPSS 13.0 was used to perform a summation of scores from questions 10, 11, and 12 to derive a mean of 6.00. Table 13 shows the mean score and standard deviation for Standard IV, support, management, and operations.

Table 13: Standard IV - Support, Management, and Operations

Statements: I believe that a principal should:	N	Mean	Std. Deviation
Standard IV, support, management, and operations	419	6.00	.947

The Likert scale indicated that a score of 4 was considered important to the role of the principal. The Likert scale indicated that a score of 7 was considered very important or essential for a principal as an instructional leader. The mean score for Standard IV, support, management, and operations, was 6.00 which could be considered of high importance for a principal as an instructional leader. Seven was the most frequently selected response across the three survey statements for Standard IV.

While survey items asked principals to identify the level of importance of support, management, and operations specifically related to providing school-wide professional development, allocating discretionary funds and resources for technology, and advocating for quality technology support, interviews with principals provided further insight and

examples of technology leadership in West Virginia schools. Principals provided professional development for teachers to share ideas of how to use technology including the interactive whiteboard and other tools. Professional development was provided as needed by state, county, and school presenters as well as by the principal. One principal talked about a technology tool as "a tool for technology use and I was looking at it as a staff retool. I needed something to make people use technology and if we didn't do something we were going to get farther behind." This principal took the opportunity to get the teachers involved in learning the new technology as a way to start changing technology practices in the school.

Several principals indicated taking a job in a school that was lacking in technology. "When I first came to the school everything in the building was obsolete. The first thing was to get every teacher a new computer. The labs were out of date and obsolete. The accessibility for students was lacking, student computer ratio was not good. We updated what we had and added."

Providing necessary technology support and resources is managed by principals in different ways. Principals talked about allocating discretionary funds and monetary resources for technology implementation including: county support, supply money, equipment money, grants, fund raisers, business partners, local school improvement councils, parent teacher organizations, faculty senates, and communities. "My main role is to support and provide the new technology to allow the teachers to do their job." Principals actively worked to get grants and acquire resources. One middle school principal was able to secure 600 laptops from a government agency for the school. Another principal had 162 laptops donated to the school.

The principal who was able to acquire 600 laptops was involved in the communication to get the laptops donated and in figuring out how to get the laptops from the government agency. The principal even talked about renting a truck to drive and pick up the laptops for the school. The principal demonstrated an active role in locating and securing resources for the school.

One principal has a discretionary fund for hiring substitutes. At the end of the year, unused funds are reallocated to purchase technology tools for teachers. “When [teachers] come to me with valid [technology] ideas, and ask if this is something that we can do. It is up to me to get money to do it. They have been inspired and now it is up to me to see if I can come up with the money to make it work.” This use of resources benefited the school in two ways: improved attendance by the staff and increased involvement in technology use by teachers.

Principals advocated for high quality technology support. Technical support was provided in a variety of ways. Technology specialists, counties, and Regional Education Service Agencies, and even principals provided technical support. One school had students that would provide troubleshooting for technical problems.

The common thread in this standard was that interviewed principals were highly engaged in actively seeking additional resources either for professional development or the advancement of the school through technology. Many of the principals worked to acquire large grants for various types of technology equipment or software and/or licenses for equipment.

Research Question Eight: Are West Virginia principals interested in professional development in the NETS-A related to Standard IV, support, management, and operations?

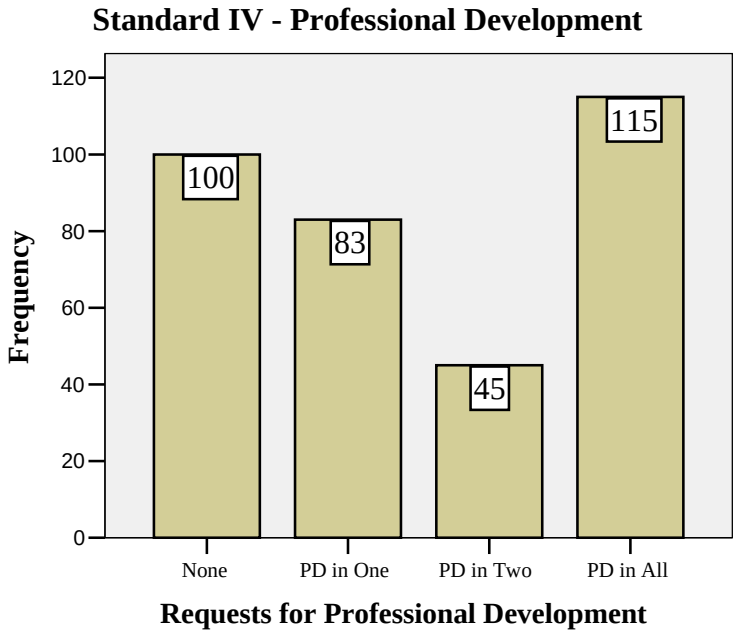
Participants were asked if they were interested in professional development for each of the statements related to Standard IV, support, management, and operations by answering yes or no. Of 364 respondents, 234 (55.1%) are interested in professional development for statement ten. Of 355 respondents, 159 (37.4%) are interested in professional development in statement eleven. Of 349 respondents, 155 (36.5%) are interested in professional development in statement twelve. Table 14 shows the frequency distribution for professional development in statements ten, eleven, and twelve.

Table 14: Standard IV - Frequency Distribution for Professional Development

Professional Development		Number of Respondents	Frequency	Percent
10.	provide school-wide technology professional development for sharing ideas and resources.	364	234	55.1
11.	allocate discretionary funds and resources to advance implementation of the school technology plan.	355	159	37.4
12.	advocate for adequate, timely, and high –quality technology support services.	349	155	36.5

Figure 4 presents the summative frequency distribution for professional development in Standard IV. Of 425 participants, 83 respondents (19.5%) are interested in professional development in one statement related to Standard IV; 45 respondents (10.6%) are interested in professional development in two statements related to Standard IV; and 115 respondents (27.1%) are interested in professional development in all three statements related to Standard IV. In response to research question eight, of 425 participants, 243 respondents (57.2%) are interested in some level of professional development pertaining to Standard IV, support, management, and operations.

Figure 4: Standard IV – Interest in Professional Development



Research Question Nine: How important do West Virginia principals rate the NETS-A related to Standard V, assessment and evaluation, to the job of the principalship?

Participants were asked to rate the level of importance statements were to the role of the principalship by indicating a number on the Likert scale that was most representative of their perceptions. With 423, 420, and 418 responses respectively, statement thirteen had a mean score of 6.14; statement fourteen had a mean score of 5.92; and statement fifteen had a mean score of 5.70. Table 15 shows the mean scores and standard deviations for each of the three statements representing assessment and evaluation.

Table 15: Standard V - Descriptive Data for Individual Statements

	Statements: I believe that a principal should:	N	Mean	Std. Deviation
13.	promote and model technology use analyzing data improving student learning and productivity.	423	6.14	1.068
14.	guide teacher professional development toward individual growth in technology.	420	5.92	1.125
15.	include effective technology use as one criterion in assessing performance of instructional staff.	418	5.70	1.361

To arrive at the mean for Standard V, SPSS 13.0 was used to perform a summation of scores from questions 13, 14, and 15 to derive a mean of 5.92. Table 16 presents the mean score and standard deviation for Standard V, assessment and evaluation.

Table 16: Standard V - Assessment and Evaluation

Statements: I believe that a principal should:	N	Mean	Std. Deviation
Standard V, assessment and evaluation	415	5.92	1.042

The Likert scale indicated that a score of 4 was considered important to the role of the principal. The Likert scale indicated that a score of 7 was considered very important or essential for a principal as an instructional leader. The mean score for Standard V, assessment and evaluation, was 5.92 which could be considered of high importance for a principal as an instructional leader. Seven was the most frequently selected response across the three survey statements for Standard V.

While survey items asked principals to identify the level of importance of assessment and evaluation specifically related to modeling technology use for analyzing student data, guiding professional development toward individual growth, and assessing technology performance of instructional staff, interviews with principals provided further insight and examples of technology leadership in West Virginia schools. Principals guided professional development in the schools toward individual growth in technology and modeled the use of technology to analyze data. Multiple principals modeled collecting and analyzing data by using Palm handheld computers to collect and analyze teacher evaluation data. Principals also modeled effective productivity with technology

by using email for communication, word processing for documents, and completing research on the computer. In addition, many of the principals provided Palm handheld computers for teachers to collect data, keep grades, manage calendars, and increase productivity. One principal would beam school calendars and other information to teachers and have them beam to other teachers. Another principal kept the school calendar on the Palm and would print out the calendar for all teachers. Professional development was provided on how to use these tools and increase productivity.

Principals promote using technology to look at data and to analyze data. Principals talked about computer programs to assist special education teachers in writing individual education plans and increasing their efficiency. The principal modeled how to organize folders, use attachments, and use email to encourage personal growth with teachers in the school. Another principal produces all handouts with the computer and spends time one-on-one helping teachers set up Excel documents and Word documents. The principals work in several ways to promote individual growth.

There is a technology component on teacher evaluations. Several principals indicated this was a good addition to the evaluation process. “So I look at the specific lines on the evaluation. I am not looking for technology to just be used; I am looking for ways that it is used to improve the instructional process. I am looking specifically for how kids are using technology.” One elementary principal looks to see if teachers are sending notes to parents by handwriting or computerized, looking for lesson plans created on the computer, and looking to see if they have planned to use computers during class time as well as what the students are doing.

Several principals indicated having really good teachers that were not comfortable with the computer. “As an administrator, I must be fair and try to lead them. It is hard to get good teachers, I don’t want to scare them, but lead gently, encourage them, and have them try new technology without being threatened. I am supporting them through opportunities.” The same principal talked about providing multiple professional development opportunities in the school for growth in technology.

Another technique for a middle school principal was to target two teachers in the school to send to additional training so they could come back and assist the principal in bringing the other teachers on board with technology integration. Other principals talked about teachers embracing technology and encouraging them. One principal talked about using a blog to involve teachers in the instructional management of the school. The principal wanted an open forum for everyone to use where issues could be posted for discussion.

Principals talked about the different levels of technology capacity of teachers within the schools. They maintained an expectation for teachers to grow in use of technology. “I have different people in varying degrees in capacity.” The principal indicated giving these teachers one little thing to learn in technology at a time and repeating this process. This principal shared the following motto, “Gentle pressure applied relentlessly!” Another principal talked about trying to pull people away from their comfort zone since you have some teachers not comfortable with technology. “You try to encourage them to use technology, you model, provide resources, you provide the training, and then you go into the classroom to see if they are using it.”

Common threads in the assessment and evaluation standard were to provide professional development to promote individual growth in technology, use technology for analyzing student data, model technology use in the school, and encourage professional growth in technology through the evaluation process. The motto of "gentle pressure applied relentlessly!" could be applied to answers that many principals expressed when asked about assessing performance of professional staff in technology.

Research Question Ten: Are West Virginia principals interested in professional development in the NETS-A related to Standard V, assessment and evaluation?

Participants were asked if they were interested in professional development for each of the statements related to Standard V, assessment and evaluation, by answering yes or no. Of the 356 respondents, 228 (53.6%) are interested in professional development for statement thirteen. Of the 348 respondents, 206 (48.5%) are interested in professional development in statement fourteen. Of the 351 respondents, 177 (41.6%) are interested in professional development in statement fifteen. Table 17 presents the frequency distribution for professional development in statements thirteen, fourteen, and fifteen.

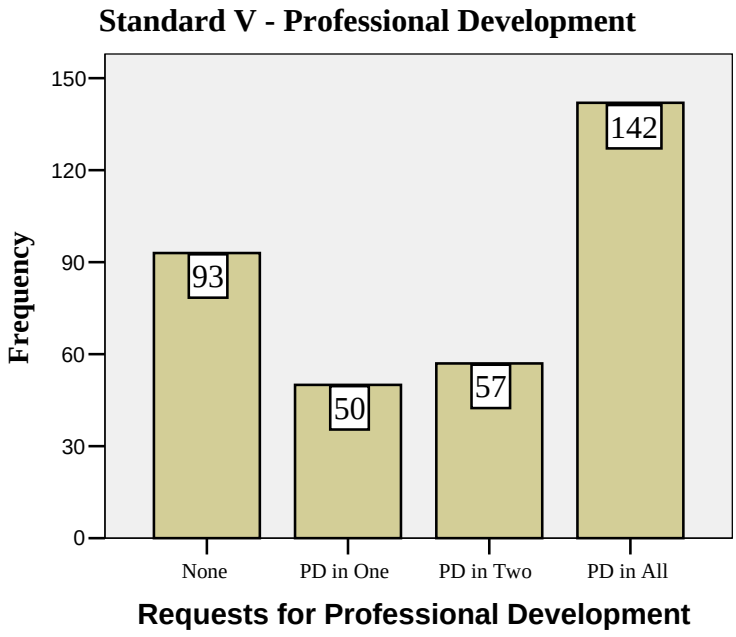
Table 17: Standard V - Frequency Distribution for Professional Development

Professional Development		Number of Respondents	Yes Frequency	Percent
13.	promote and model technology use analyzing data improving student learning and productivity.	356	228	53.6
14.	guide teacher professional development toward individual growth in technology.	348	206	48.5
15.	include effective technology use as one criterion in assessing performance of instructional staff.	351	177	41.6

Figure 5 illustrates the summative frequency distribution for professional development in Standard V. Of the 425 participants, 50 respondents (11.8%) are

interested in professional development in one statement related to Standard V; 57 respondents (13.4%) are interested in professional development in two statements related to Standard V; and 142 respondents (33.4%) are interested in professional development in all three statements related to Standard V. In response to research question ten, of the 425 participants, 249 respondents (58.6%) are interested in some level of professional development pertaining to Standard V, assessment and evaluation.

Figure 5: Standard V – Interest in Professional Development



Research Question Eleven: How important do West Virginia principals rate the NETS-A related to Standard VI, social, legal, and ethical issues, to the job of the principalship?

Participants were asked to rate the level of importance statements were to the role of the principalship by indicating a number on the Likert scale that was most representative of their perceptions. With 422, 421, and 419 responses respectively, statement sixteen had a mean score of 5.95, statement seventeen had a mean score of

6.33, and statement eighteen had a mean score of 5.85. Table 18 shows the mean scores and standard deviations for each of the three statements pertaining to the social, legal, and ethical issues standard.

Table 18: Standard VI - Descriptive Data for Individual Statements

	Statements: I believe that a principal should:	N	Mean	Std. Deviation
16.	secure and allocate technology resources to enable teachers to meet the needs of all learners.	422	5.95	1.240
17.	enforce an "Acceptable Use Policy" and other policies related to security, copyright, and technology use.	421	6.33	1.151
18.	participate in planning a focus on healthy and safe practices related to technology use.	419	5.85	1.239

To arrive at the mean for Standard VI, SPSS 13.0 was used to perform a summation of scores from questions 16, 17, and 18 to derive a mean of 6.05. Table 19 provides the mean score and standard deviation for Standard VI, social, legal, and ethical issues.

Table 19: Standard VI - Social, Legal, and Ethical Issues

Statements: I believe that a principal should:	N	Mean	Std. Deviation
Standard VI, social, legal, and ethical issues	418	6.05	1.000

The Likert scale indicated that a score of 4 was considered important to the role of the principal. The Likert scale indicated that a score of 7 was considered very important or essential for a principal as an instructional leader. The mean score for Standard VI, social, legal, and ethical issues, was 6.05 which could be considered of high importance for a principal as an instructional leader. Seven was the most frequently selected response across the three survey statements for Standard VI.

While survey items asked principals to identify the level of importance of social, legal, and ethical issues specifically related to securing technology resources to meet the

needs of all learners, enforcing policies related to security and copyright, and planning a focus on healthy and safe technology practices, interviews with principals provided further insight and examples of technology leadership in West Virginia schools. Every principal interviewed indicated having an acceptable use policy that was enforced within the school. Principals cited a variety of other topics when asked about security and copyright policies and procedures.

Principals talked about their schools' acceptable use policies matching county and state policies. Principals talked about all students and staff signing these policies. Students were trained in the policy, then students and parents had to sign the policy agreeing that students would properly use technology at the school. Several principals used media release forms for students, teachers, and community members to allow pictures to be used on the school website. Principals also talked about making certain all appropriate forms were completed.

Computer and Internet safety was a concern that principals addressed. One principal talked about training students on using the Internet safely while teachers in another school had to take a class to allow students to be on the Internet. Appropriate supervision was required before allowing students to work online. Computer safety in one school included sessions for teachers on cyber bullying. In addition, principals talked about having filters on school computers to assist in safety.

The principals stressed that all software on computers at the schools had appropriate licenses for use. "Everything on the computers must have a license!" Multiple principals talked about purchasing the appropriate number of licenses and that they were careful to make sure they followed the copyright laws.

Making sure that students had adequate access to technology was a concern for many principals. One school is totally wireless because students were not able to adequately access the Internet to use resources for supporting the curriculum. The students were having trouble with the mobile laptops in accessing the Internet. As a result, the high school principal now has a secure wireless network in the entire school.

Ethical use of technology for some principals meant ensuring access for all students in the school. One school had a laptop check out program so that students without computers at home could have access. According to the principal, this program was very effective and the students took proper care of the equipment without any misuse. Another school provided additional access for students by keeping a school lab open for two hours after school. Equal access also included providing special technology for visually impaired students.

Research Question Twelve: Are West Virginia principals interested in professional development in the NETS-A related to Standard VI, social, legal, and ethical issues?

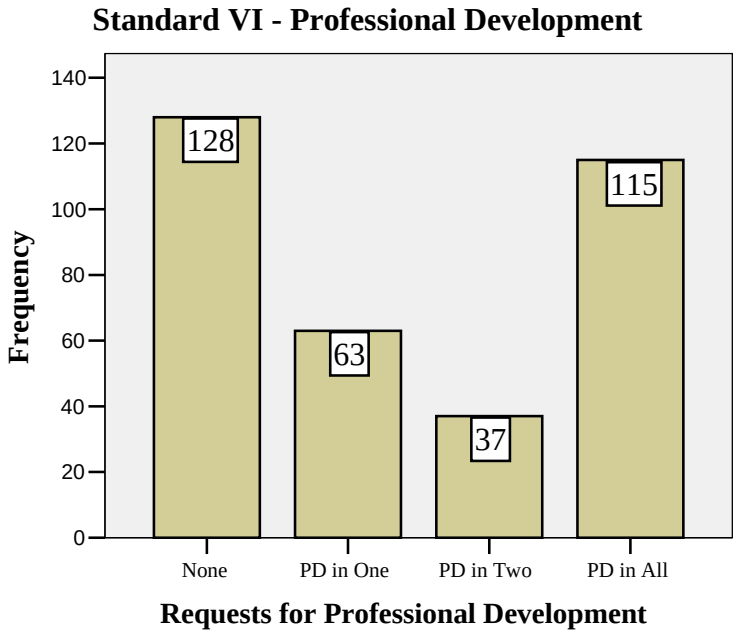
Participants were asked if they were interested in professional development for each of the statements related to Standard VI, social, legal, and ethical issues, by answering yes or no. Of the 351 respondents, 191 (44.9%) are interested in professional development for statement sixteen. Of the 352 respondents, 145 (34.1%) are interested in professional development in statement seventeen. Of the 353 respondents, 163 (38.4%) are interested in professional development in statement eighteen. Table 20 presents the frequency distribution for professional development in statements sixteen, seventeen, and eighteen.

Table 20: Standard VI - Frequency Distribution for Professional Development

Professional Development		Number of Respondents	Yes Frequency	Percent
16.	secure and allocate technology resources to enable teachers to meet the needs of all learners.	351	191	44.9
17.	enforce an "Acceptable Use Policy" and other policies related to security, copyright, and technology use.	352	145	34.1
18.	participate in planning a focus on healthy and safe practices related to technology use.	353	163	38.4

Figure 6 presents the summative frequency distribution for professional development in Standard VI. Of the 425 participants, 63 respondents (14.8%) are interested in professional development in one statement related to Standard VI; 37 respondents (8.7%) are interested in professional development in two statements related to Standard VI; and 115 respondents (27.1%) are interested in professional development in all three statements related to Standard VI. In response to research question twelve, of the 425 participants, 215 respondents (50.6%) are interested in some level of professional development pertaining to Standard VI, social, legal, and ethical issues.

Figure 6: Standard VI – Interest in Professional Development



Summary of the Level of Importance of NETS-A

To arrive at the mean for each standard, SPSS 13.0 was used to perform a summation of scores from statements representing each standard to derive the mean. The analyses of the mean scores for the standards revealed a range of mean scores from 5.90 to 6.26. Standard I, leadership and vision, had the lowest mean of 5.90. Standard II, learning and teaching, had the highest mean of 6.26. Table 21 illustrates the mean scores and standard deviations for all six standards.

Table 21: All Standards - Descriptive Data

	N	Min	Max	Mean	Std. Deviation
Standard I, leadership and vision	420	2.33	7.00	5.90	1.094
Standard II, learning and teaching	420	1.67	7.00	6.26	.895
Standard III, productivity and professional practice	422	2.00	7.00	5.99	1.038
Standard IV, support, management, and operations	419	2.67	7.00	6.00	.947
Standard V, assessment and evaluation	415	2.00	7.00	5.92	1.042
Standard VI, social, legal, and ethical issues	418	1.00	7.00	6.05	1.000

The data revealed the uniformity in the perceptions of West Virginia principals on the importance of the statements to the role of the principalship. Every mean score revealed that principals as a group rated the statements as having high importance to the job of the principalship. Additional analyses of the data revealed some differences in how different groups of principals rated the statements.

Summary of Professional Development Interest in NETS-A

The analyses of principals' interest in professional development revealed a high percentage of principals interested in professional development. SPSS 13.0 was used to derive a summative frequency distribution for interest in professional development for each standard. Table 22 illustrates the frequency of "yes" responses and the percent of principals interested in some form of professional development for each standard.

Table 22: Summary of Interest in Professional Development

	Yes Frequency	Percent
Standard I, leadership and vision	256	60.3%
Standard II, learning and teaching	314	73.8%
Standard III, productivity and professional practice	240	56.4%
Standard IV, support, management, and operations	243	57.2%
Standard V, assessment and evaluation	249	58.6%
Standard VI, social, legal, and ethical issues	215	50.6%

The highest interest in some form of professional development was 73.8% for Standard II, learning and teaching. The least interest in some form of professional development was 50.6% for Standard VI, social, legal, and ethical issues. More than 50% of respondents were interested in some level of professional development for every standard.

Ancillary Findings

The *Survey of Technology Experiences* collected demographic data from the respondents, including: whether the respondent was a principal or assistant principal, the grade levels in the school, years experience working in education, if they routinely access email and complete technology related activities from home, if they have taken an online course, and the number of hours of participation in technology related professional development in the last year.

The demographic data were analyzed across groups. An analysis of Variance (ANOVA) was used to determine if any significant differences existed between the standards variables and the demographic data as well as the professional development for standards and the demographic data. The Kruskal-Wallis Test was a more refined test used to look for significant differences. The value $p < 0.05$ was used to determine significance. This section describes the analysis of the significance discovered between the principals' perceptions of the statements related to the NETS-A and the demographic data as well as the principals' requests for professional development and the demographic data.

Role in Education

In terms of role in education, 260 respondents (61.2%) served as principals and 150 respondents (35.3%) served as assistant principals. An analysis of the data using a One-way ANOVA showed no significance between the role in education across all categories (principal, assistant principal, or neither) and rating the level of importance of the standards. The Kruskal-Wallis test also revealed no significance.

The request for professional development in the standards was also analyzed using a One-way ANOVA with the role in education across all categories. The test revealed no significance between the interest in professional development and the role in education. The Kruskal-Wallis test also confirmed no significance exists between the interest in professional development and the role in school.

Routine Email and Technology Related Work from Home

Participants were asked if they routinely access email and perform technology related work from home. Of the 425 participants, 12 respondents (2.8%) had no computer at home; 72 respondents (16.9%) did not routinely access email or do work related technology activities from home; and 333 respondents (78.4%) routinely access email or do work related technology activities from home, for a total of 417 respondents. Eight respondents (1.9%) did not indicate a response to the question.

The One-way ANOVA revealed that significance existed between the respondents rating the level of importance of the technology standards and the response of yes, no, or no computer to routinely accessing email and performing work related technology activities from home. The significance between standards and the demographic include: Standard I ($p = 0.010$), Standard II ($p = 0.025$), Standard III ($p = 0.019$), Standard IV ($p = 0.003$), Standard V ($p = 0.000$), and Standard VI ($p = 0.002$). Table 23 presents significance between the respondents' perceptions of the level of importance of the technology standards and respondents who answered yes, no, or no computer to routinely accessing email and doing work related technology activities from home.

Table 23: Significance of Standards with Email and Technology Related Work from Home

		Sum of Squares	df	Mean Square	F	Sig.
Standard I	Between Groups	10.975	2	5.487	4.652	.010*
	Within Groups	482.468	409	1.180		
	Total	493.442	411			
Standard II	Between Groups	5.871	2	2.935	3.722	.025*
	Within Groups	323.315	410	.789		
	Total	329.186	412			
Standard III	Between Groups	8.484	2	4.242	4.003	.019*
	Within Groups	436.617	412	1.060		
	Total	445.101	414			
Standard IV	Between Groups	10.355	2	5.177	5.899	.003*
	Within Groups	358.951	409	.878		
	Total	369.306	411			
Standard V	Between Groups	18.029	2	9.015	8.599	.000*
	Within Groups	424.555	405	1.048		
	Total	442.584	407			
Standard VI	Between Groups	12.372	2	6.186	6.349	.002*
	Within Groups	398.528	409	.974		
	Total	410.901	411			

*Significant at the 0.05 level.

The Kruskal-Wallis test also revealed significance between the respondents' rating the level of importance of the standards and the response to routinely accessing email and doing work related technology activities from home. Significance was found in Standard I ($p = 0.008$), Standard III ($p = 0.027$), Standard IV ($p = 0.004$), Standard V ($p = 0.001$), and Standard VI ($p = 0.002$). Table 24 presents the significance between the respondents' perceptions of the level of importance of the standards and the response to routinely accessing email and doing work related technology activities from home.

Table 24: Standards and Significance with Email and Technology Related Work from Home

	Standard I	Standard II	Standard III	Standard IV	Standard V	Standard VI
Chi-Square	9.693	5.731	7.227	11.210	13.486	12.913
df	2	2	2	2	2	2
Asymp. Sig.	.008*	.057	.027*	.004*	.001*	.002*

*Significant at the 0.05 level.

Further analysis of the data revealed that principals who routinely access email and perform other technology related activities from home rate the level of importance of the standards higher than the principals that have no computer or do not access email or perform other technology related activities from home across all standards. Table 25 shows the mean scores for each standard based on participants' answers to routinely access email or perform technology related activities from home.

Table 25: Means of Importance of Standards by Email and Technology Related Work from Home

Email from home		Standard I	Standard II	Standard III	Standard IV	Standard V	Standard VI
No computer	Mean	5.70	5.85	5.89	5.77	5.64	5.83
	N	10	11	12	10	11	10
	Std. Dev.	1.732	1.401	1.131	1.466	1.224	1.354
No	Mean	5.55	6.06	5.69	5.68	5.49	5.69
	N	71	71	72	72	71	72
	Std. Dev.	1.147	.997	1.155	.995	1.206	1.096
Yes	Mean	5.97	6.32	6.07	6.09	6.03	6.14
	N	331	331	331	330	326	330
	Std. Dev.	1.049	.842	.997	.905	.973	.950

An analysis of the data using the One-way ANOVA and the Kruskal-Wallis Test yielded no significance between the respondents' request for professional development and the respondents' answer to routinely accessing email and doing work related technology activities from home across all standards.

Participation in Technology Related Professional Development in the Last Year

Participants were asked to identify the number of hours spent participating in technology related professional development in the last year. Responses were stratified into five categories: none, less than 1 hour, between 1 and 4 hours, between 5 and 10 hours, and 11 or more hours. The number of hours of participation in technology related professional development was fairly evenly distributed between three of the five groups. Of the 425 participants, 21 respondents (4.9%) had no technology related professional development within the last year; 20 respondents (4.7%) had less than 1 hour of technology related professional development within the last year; 144 respondents (33.9%) had between 1 and 4 hours of technology related professional development within the last year; 126 respondents (29.6%) had between 5 and 10 hours of technology related professional development within the last year; and 104 respondents (24.5%) had 11 hours or more of technology related professional development within the last year, for a total of 415 respondents. Ten participants (2.4%) did not specify the number of hours of technology related professional development within the last year. Table 26 provides the frequency of participation in technology related professional development within the last year.

Table 26: Frequency of Participation in Technology Related Professional Development

		Frequency	Percent
Valid	None	21	4.9
	Less than 1 hr	20	4.7
	Between 1-4 hrs	144	33.9
	Between 5-10 hrs	126	29.6
	11 hrs or more	104	24.5
	Total	415	97.6
Missing	System	10	2.4
Total		425	100.0

Utilizing a One-way ANOVA, the analysis revealed that significance existed between the respondents' perceptions for the level of importance of technology standards and the respondents' participation in technology related professional development in the last year. The levels of significance are: Standard I ($p = 0.000$), Standard II ($p = 0.000$), Standard III ($p = 0.01$), Standard IV ($p = 0.000$), Standard V ($p = 0.000$), and Standard VI ($p = 0.000$). Table 27 displays the significance between the respondents' perceptions of levels of importance of the standards and the number of hours participating in technology related professional development experiences in the last year.

Table 27: Significance between Standards and Number of Hours of Technology Related Professional Development

		Sum of Squares	df	Mean Square	F	Sig.
Standard I	Between Groups	34.571	4	8.643	7.725	.000*
	Within Groups	453.128	405	1.119		
	Total	487.699	409			
Standard II	Between Groups	22.881	4	5.720	7.505	.000*
	Within Groups	309.457	406	.762		
	Total	332.338	410			
Standard III	Between Groups	19.057	4	4.764	4.534	.001*
	Within Groups	428.690	408	1.051		
	Total	447.747	412			
Standard IV	Between Groups	25.119	4	6.280	7.375	.000*
	Within Groups	344.880	405	.852		
	Total	369.999	409			
Standard V	Between Groups	49.657	4	12.414	12.589	.000*
	Within Groups	395.440	401	.986		
	Total	445.097	405			
Standard VI	Between Groups	24.112	4	6.028	6.302	.000*
	Within Groups	387.368	405	.956		
	Total	411.480	409			

*Significant at the 0.05 level.

The Kruskal-Wallis test also revealed significance existed between the respondents' perceptions of the importance of the standards to the role of the principalship and the number of hours of participation in technology related professional development within the last year. The levels of significance are: Standard I ($p = 0.000$), Standard II ($p = 0.000$), Standard III ($p = 0.002$), Standard IV ($p = 0.000$), Standard V ($p = 0.000$), and Standard VI ($p = 0.000$). Table 28 displays the significance between the respondents' perceptions of the importance of the standards to the number of hours of participation in technology related professional development within the last year.

Table 28: Significance between Standards and Hours of Technology Related Professional Development

	Standard I	Standard II	Standard III	Standard IV	Standard V	Standard VI
Chi-Square	28.276	26.191	16.740	27.613	39.597	31.765
df	4	4	4	4	4	4
Asymp. Sig.	.000*	.000*	.002*	.000*	.000*	.000*

*Significant at the 0.05 level.

Table 29 displays a comparison of the means for each category for respondents' participation in professional development and the respondents' perception of level of importance of the standards. Beginning with participation in professional development of less than one hour, the mean value increases in each standard as the number of hours of participation in professional development increases, illustrating a positive relationship.

Table 29: Means of Importance of Standards by Participation in Professional Development

Last year PD		Standard I	Standard II	Standard III	Standard IV	Standard V	Standard VI
None	Mean	5.56	5.84	5.71	5.78	5.49	5.89
	N	21	21	21	21	21	21
	Std. Dev	1.045	1.047	.996	1.040	.981	.871
Less than 1 hr	Mean	5.23	5.70	5.40	5.53	4.85	5.42
	N	20	19	20	20	20	20
	Std. Dev.	1.119	1.138	1.445	.951	1.295	.990
Between 1-4 hrs	Mean	5.68	6.11	5.85	5.81	5.75	5.89
	N	141	142	143	142	141	142
	Std. Dev.	1.168	.983	1.099	1.040	1.124	1.080
Between 5-10 hrs	Mean	6.00	6.33	6.04	6.03	6.00	6.09
	N	124	126	126	123	121	125
	Std. Dev.	1.071	.847	.930	.906	.930	.921
11 + hrs	Mean	6.28	6.56	6.26	6.37	6.34	6.39
	N	104	103	103	104	103	102
	Std. Dev.	.856	.614	.937	.720	.789	.911
Total	Mean	5.90	6.26	5.98	6.00	5.92	6.05
	N	410	411	413	410	406	410
	Std. Dev.	1.092	.900	1.042	.951	1.048	1.003

Utilizing a One-way ANOVA, the analysis revealed significance between the respondents' request for professional development and the number of hours participating in professional development in the last year for three of the standards. Significance was found in the requests for professional development in the following: Standard I ($p = 0.040$), Standard IV ($p = 0.011$), and Standard VI ($p = 0.046$). Table 30 presents the significance found between requests for professional development in Standards I, IV, and VI and the number of hours of participation in technology related professional development within the last year.

Table 30: Significance of Requests for Professional Development and Hours of Professional Development

		Sum of Squares	df	Mean Square	F	Sig.
Standard I	Between Groups	15.351	4	3.838	2.539	.040*
	Within Groups	504.756	334	1.511		
	Total	520.106	338			
Standard II	Between Groups	3.477	4	.869	.829	.507
	Within Groups	360.643	344	1.048		
	Total	364.120	348			
Standard III	Between Groups	8.953	4	2.238	1.368	.245
	Within Groups	556.508	340	1.637		
	Total	565.461	344			
Standard IV	Between Groups	19.525	4	4.881	3.327	.011*
	Within Groups	484.207	330	1.467		
	Total	503.731	334			
Standard V	Between Groups	12.956	4	3.239	2.098	.081
	Within Groups	507.858	329	1.544		
	Total	520.814	333			
Standard VI	Between Groups	16.039	4	4.010	2.456	.046*
	Within Groups	538.749	330	1.633		
	Total	554.788	334			

*Significant at the 0.05 level.

The Kruskal-Wallis Test also revealed significance between respondents' request for professional development and the number of hours of participation in technology

related professional development within the last year. The levels of significance are: Standard I (p = 0.020) and Standard IV (p = 0.013). Table 31 displays the significance between respondents' requests for professional development and the number of hours of participation in technology related professional development within the last year.

Table 31: Significance of Requests for Professional Development and Hours of Professional Development

	Standard I	Standard II	Standard III	Standard IV	Standard V	Standard VI
Chi-Square	11.714	3.956	4.802	12.696	8.468	9.197
df	4	4	4	4	4	4
Asymp. Sig.	.020*	.412	.308	.013*	.076	.056

*Significant at the 0.05 level.

Further analysis based upon percentages revealed that principals participating in one to four hours of professional development within the last year expressed the least interest in professional development across Standards I, IV, and VI compared to all of the other categories of participation in professional development within the last year. Analysis also revealed that respondents with no technology related professional development within the last year recognized a need for professional development and 68.4% to 82.4% of them expressed interest in professional development in Standards I, IV, or VI. Table 32 shows the percentages of principals interested in some form of professional development based on hours of participation in professional development during the past year.

Table 32: Percentages of Principals Interested in Professional Development by Participation in Professional Development

Percent Interested in Some Form of Professional Development Based on Participation in Professional Development in the Last Year				
Last Year PD		Standard I	Standard IV	Standard VI
None	% interested in PD	82.4%	78.9%	68.4%
	number	16	15	13
Less than 1 hr	% interested in PD	77.2%	83.3%	77.8%
	number	14	15	14
Between 1-4 hrs	% interested in PD	67.8%	63.6%	55.7%
	number	82	77	68
Between 5-10 hrs	% interested in PD	75.7%	70.4%	66.0%
	number	78	69	64
11 + hrs	% interested in PD	76.9%	77.2%	64.6%
	number	60	61	51

Online Courses

Participants were asked whether or not they had taken an online course. A majority of respondents have taken an online course. Of the 425 participants, 264 respondents (62.1%) have taken an online course; and 142 respondents (33.4%) have not taken an online course, for a total of 406 respondents. Nineteen respondents (4.5%) did not indicate whether or not they have taken an online course.

An analysis of the data using a One-way ANOVA revealed significance between the respondents' perceptions on the level of importance of the standards and if they have taken an online course across: Standard II ($p = 0.041$), Standard III ($p = 0.003$), Standard IV ($p = 0.021$), Standard V ($p = 0.001$), and Standard VI ($p = 0.025$). Table 33 displays the significance between the respondents' perceptions of the level of importance of the standards and whether the respondents have taken an online course.

Table 33: Significance of Importance of Standards and Participation in an Online Class

		Sum of Squares	df	Mean Square	F	Sig.
Standard I	Between Groups	.905	1	.905	.756	.385
	Within Groups	477.792	399	1.197		
	Total	478.697	400			
Standard II	Between Groups	3.257	1	3.257	4.184	.041*
	Within Groups	311.316	400	.778		
	Total	314.573	401			
Standard III	Between Groups	9.424	1	9.424	8.887	.003*
	Within Groups	426.284	402	1.060		
	Total	435.707	403			
Standard IV	Between Groups	4.692	1	4.692	5.380	.021*
	Within Groups	347.939	399	.872		
	Total	352.631	400			
Standard V	Between Groups	11.204	1	11.204	10.652	.001*
	Within Groups	416.530	396	1.052		
	Total	427.735	397			
Standard VI	Between Groups	4.958	1	4.958	5.086	.025*
	Within Groups	388.979	399	.975		
	Total	393.937	400			

*Significant at the 0.05 level.

The Kruskal-Wallis test also revealed significance between respondents' perceptions of the level of importance of the standards and whether the respondents had taken an online course. Areas of significance were as follows: Standard II ($p = 0.021$), Standard III ($p = 0.009$), Standard IV ($p = 0.014$), Standard V ($p = 0.001$), and Standard VI ($p = 0.009$). Table 34 displays the significance between the respondents' perceptions of the level of importance of the standards and whether the respondent had taken an online course.

Table 34: Significance of Importance of Standards and Taking an Online Course

	Standard I	Standard II	Standard III	Standard IV	Standard V	Standard VI
Chi-Square	1.466	5.354	6.803	6.085	10.454	6.867
df	1	1	1	1	1	1
Asymp. Sig.	.226	.021*	.009*	.014*	.001*	.009*

*Significant at the 0.05 level.

Further analysis of the data revealed that respondents that had taken online courses rated the level of importance of the standards higher than respondents that had not taken online courses across all standards. Table 35 presents the means of importance of the standards by participation in an online course.

Table 35: Means of Importance of Standards by Participation in an Online Course

Taken online course		Standard I	Standard II	Standard III	Standard IV	Standard V	Standard VI
No	Mean	5.84	6.15	5.78	5.87	5.71	5.92
	N	140	141	142	140	139	142
	Std. Dev.	1.080	.944	1.163	.971	1.103	1.026
Yes	Mean	5.94	6.34	6.10	6.10	6.06	6.15
	N	261	261	262	261	259	259
	Std. Dev.	1.102	.847	.950	.913	.982	.966
Total	Mean	5.91	6.28	5.99	6.02	5.94	6.07
	N	401	402	404	401	398	401
	Std. Dev.	1.094	.886	1.040	.939	1.038	.992

An analysis of the data using a One-way ANOVA and the Kruskal-Wallis test revealed no significance between respondents' requests for professional development and whether or not the participants had taken an online course.

Grade Levels in the School

Participants were asked to identify grade levels in their school. This was an open response item. Responses were then assigned to one of seven categories by the researcher. The seven categories were elementary, elementary/middle, middle, middle/high, high, high/adult, and other. Of the 425 participants, 175 respondents (41.2%) worked in an elementary school; 20 respondents (4.7%) worked in an elementary/middle school; 79 respondents (18.6%) worked in a middle school; 17 respondents (4.0%) worked in a middle/high school; 106 respondents (24.9%) worked in a high school; 15 respondents (3.5%) worked in a high/adult school; and 3 respondents (0.7%) worked in the other category, for a total of 415 respondents. Ten respondents (2.4%) did not indicate grade levels in the school.

An analysis of the data using a One-way ANOVA and the Kruskal-Wallis test yielded no significance between the respondents' perceptions on the level of importance of the standards and the grade level in the school where the respondent works.

Performing the One-way ANOVA and the Kruskal-Wallis tests on the data did not reveal any significance between the respondents' request for professional development and the grade level in the school where the respondent works.

Experience in Education

Participants were asked how many years they had worked in education. This was an open response question. Responses were assigned to one of four categories. The four categories or groups were: years 0 – 10, 11 – 20, 21 – 30, and 31+. Of the 425 participants, 36 respondents (8.5%) had 0 through 10 years of experience in education; 96 respondents (22.6%) had 11 through 20 years of experience in education; 150

respondents (35.3%) had 21 through 30 years of experience in education; and 140 respondents (32.9%) had 31 or more years of experience in education, for a total 422 respondents. Three respondents (0.7%) did not indicate the years of experience in education.

Utilizing the One-way ANOVA and the Kruskal-Wallis test, the data were analyzed and no significance was found between the respondents' perceptions of the level of importance of the standards and the respondents' years of experience in education.

When analyzing the respondents' requests for professional development and the respondents' years of experience in education using a One-way ANOVA and the Kruskal-Wallis test, no significance was found.

Summary

This chapter presented the statistical analyses of the data collected from the *Survey of Technology Experiences* and the qualitative analyses of the data gathered from interviews with principals recognized by the West Virginia Department of Education or the Regional Education Service Agencies as effective technology leaders. The National Educational Technology Standards for Administrators (NETS-A) were important in the development of the questions for the *Survey of Technology Experiences* as well as the questions used in the interview process.

An in-depth review of the literature revealed the importance of the role of the principal as the leader in change, as the technology leader in a school, and as the instructional leader of the school. The literature also revealed the complex needs of principals pertaining to professional development for technology integration in the school. The *Survey of Technology Experiences* was completed by 425 respondents with a

63% return rate for a 95% confidence level with a 3.8% margin of error or a 99% confidence level with a 5% margin of error.

The *Survey of Technology Experiences* utilized a seven point Likert scale for respondents to rate their perceptions on the level of importance each statement was to the role of the principalship. Mean scores were calculated for each statement. To arrive at the mean for each standard, SPSS 13.0 was used to perform a summation of scores from the three statements to derive one mean for ease of interpretation and analyses. Frequencies were calculated for respondents' requests for professional development in each statement as well as a cumulative frequency of respondents' requests for professional development pertaining to each standard.

The means for the standards ranged from a low of 5.90 for leadership and vision to a high of 6.26 for learning and teaching. With a score of 7 representing very important, or "I think this is essential for a principal as an instructional leader", respondents rated all six standards well above the level of important. Each standard could be called of high importance to the role of the principalship.

The frequencies for interest in professional development in the standards revealed that more than 50% of respondents were interested in some form of professional development in all six standards. Respondents' largest interest in professional development was for Standard II, learning and teaching (73.8%). Standard VI, social, legal, and ethical issues (50.6%), received the least number of responses interested in professional development.

The interview data were analyzed and descriptions and examples of technology leadership by principals identified as effective technology leaders were provided for each

standard. There were many similarities in the descriptions of the implementation of the standards by principals recognized as effective technology leaders. For example, the principals explained turning on the computer as almost the first act completed upon arrival at the school to check email or perform other administrative duties. The most diversity appeared in the analysis of Standard II as principals described what students would be doing if the teacher were effectively implementing technology in the classroom.

Ancillary findings in this study indicated some significance in respondents' ratings of the level of importance of the standards to the role of the principalship. There was no significance found in rating the level of importance when compared to role in education, grade levels in the school, or in years experience in education. Significance was found in rating the level of importance of the standards and routinely accessing email and performing technology related activities from home, number of hours of participation in technology related professional development in the last year, and if the participants had taken an online course. The only significance found in requests for professional development was with some standards and the number of hours of participation in technology related professional development in the last year.

CHAPTER FIVE: SUMMARY AND DISCUSSION

Introduction

The current literature refers to the principal in many ways including: "instructional artist in residence" (Tirozzi, 2001, p. 435), "gatekeeper of change" (Fullan, 2001b, p. 59), "role models as technology users" (Heaton & Washington, 1999, p. 4) and "protectors of vision" (Copeland, 2003, p. 391). The in-depth review of the literature supported the importance of the principal as leader in change, as technology leader in a school, and as the instructional leader of a school. Without a doubt, principals must provide technology leadership in schools since leadership is one of the most important factors affecting successful technology integration (Byrom & Bingham, 2001; *Technology in Schools*, 2002). This chapter presents the conclusions regarding principals' perceptions of the importance of the NETS-A, interests in professional development, and implementation of the technology standards. Implications and recommendations for further study derived from the findings on the *Survey of Technology Experiences* and interviews with principals are also presented.

Research Questions

Quantitative methods were used to answer the following questions:

1. How important do West Virginia principals rate the NETS-A related to Standard I, leadership and vision, to the job of the principalship?
2. Are West Virginia principals interested in professional development in the NETS-A related to Standard I, leadership and vision?
3. How important do West Virginia principals rate the NETS-A related to Standard II, learning and teaching, to the job of the principalship?

4. Are West Virginia principals interested in professional development in the NETS-A related to Standard II, learning and teaching?
5. How important do West Virginia principals rate the NETS-A related to Standard III, productivity and professional practice, to the job of the principalship?
6. Are West Virginia principals interested in professional development in the NETS-A related to Standard III, productivity and professional practice?
7. How important do West Virginia principals rate the NETS-A related to Standard IV, support, management, and operations, to the job of the principalship?
8. Are West Virginia principals interested in professional development in the NETS-A related to Standard IV, support, management, and operations?
9. How important do West Virginia principals rate the NETS-A related to Standard V, assessment and evaluation, to the job of the principalship?
10. Are West Virginia principals interested in professional development in the NETS-A related to Standard V, assessment and evaluation?
11. How important do West Virginia principals rate the NETS-A related to Standard VI, social, legal, and ethical issues, to the job of the principalship?
12. Are West Virginia principals interested in professional development in the NETS-A related to Standard VI, social, legal, and ethical issues?

In addition to answering these questions, the study used qualitative methods to describe the implementation of these standards by West Virginia principals identified as effective technology leaders by either the West Virginia Department of Education or the Regional Education Service Agencies.

Methods

This mixed methods study used quantitative methods to examine West Virginia principals' perceptions of the importance of the NETS-A to the role of the principalship and to determine their interest in professional development related to the NETS-A. Qualitative methods were used to describe the implementation of the NETS-A by West Virginia principals identified as effective technology leaders. The researcher-designed survey, *Survey of Technology Experiences,* was sent to a stratified random sample of West Virginia principals. See Appendix M for the return rate graph. Interviews were conducted face-to-face and via telephone with West Virginia principals identified by the West Virginia Department of Education or the Regional Education Service Agencies as effective technology leaders.

On the survey, participants were asked to rate the level of importance each statement was to the role of the principal. A 7-point Likert scale identified explicit meaning for three choices 1 = "Not Important (I do not think this is important at all to the job of the principal.)", 4 = "Important", and 7 = "Very Important (I think this is essential for a principal as an instructional leader.)". Demographic data were collected including: role in school, accessing email and doing work related technology activities from home, number of hours of participation in technology related professional development in the last year, taking an online course, grade levels in the school, and number of years experience in education.

The data were analyzed using SPSS 13.0. Descriptive statistics were used to show frequencies, means, modes, and standard deviations. The means and standard deviations were calculated for each research question pertaining to the principals' perceptions of

level of importance to the role of the principalship. Frequencies were calculated for each research question pertaining to the principals' interest in professional development.

Statistical analyses were used to determine if any significance existed between the principals' perceptions of level of importance and demographic data as well as requests for professional development and demographic data. An Analysis of Variance (ANOVA) and the Kruskal-Wallis Test were used to determine any significance between principals' perceptions of level of importance for each standard and each category of demographic data. The ANOVA and the Kruskal-Wallis Test were also used to determine any significance between principals' requests for professional development in each standard and each category of demographic data. A p value of .05 was used to determine significance for this study.

The qualitative data were collected through semi-structured interviews, which were recorded. Interviews were conducted face-to-face and via telephone. The data were transcribed, coded, and analyzed for emergent themes and conceptual categories. Findings were reported using cross case analysis.

Demographics

The population of the study consisted of 1,148 West Virginia principals. A sample size of 673 was selected to get a 50% return rate of 336 for a 95% confidence level with a 4.5% margin of error. The stratified random sample was selected from the West Virginia Department of Education database of 2006-2007 principals and assistant principals. Of the 673 participants asked to complete the *Survey of Technology Experiences*, 425 returned the survey representing a 63% return rate on the first mailing for a 95% confidence level with a 3.8% margin of error or a 99% confidence level with a 5%

margin of error. Fourteen principals representing each geographic region of the state, various grade levels, and males/females were interviewed from the list of principals recommended as effective technology leaders by the West Virginia Department of Education or the Regional Education Service Agencies.

Findings

Analyses of the principals' perceptions of the level of importance of the NETS-A to the role of the principal revealed a uniformity in the perceptions of West Virginia principals. The mean scores for each standard were: Standard I, leadership and vision (5.90); Standard II, learning and teaching (6.26); Standard III, productivity and professional practice (5.99); Standard IV, support, management, and operations (6.00); Standard V, assessment and evaluation (5.92); and Standard VI, social, legal, and ethical issues (6.05). As a group principals rated all standards as having high importance to the role of the principal.

The analyses of principals' interest in professional development revealed a need for professional development. Of the 425 participants, 256 respondents (60.3%) are interested in some level of professional development pertaining to Standard I, leadership and vision. For Standard II, learning and teaching, 314 respondents (73.8%) are interested in some level of professional development. For Standard III, productivity and professional practice, 240 respondents (56.4%) are interested in some level of professional development. For Standard IV, support, management, and operations, 243 respondents (57.2%) are interested in some level of professional development. For Standard V, assessment and evaluation, 249 respondents (58.6%) are interested in some level of professional development. For Standard VI, social, legal, and ethical issues, 215

respondents (50.6%) are interested in some level of professional development. More than 50% of respondents were interested in some level of professional development for every standard.

Ancillary findings revealed that statistical significance existed between the principals' perceptions of level of importance of the technology standards and routinely accessing email and performing work related technology activities from home. Further analysis of the data revealed that principals who routinely access email and perform other technology related activities from home rate the level of importance of the standards higher than the principals that have no computer or do not access email or perform other technology related activities from home across all standards.

Findings also showed significance between the principals' perceptions of level of importance of the technology standards and number of hours spent participating in technology related professional development in the last year. A positive relationship was found between the principals' perceptions of the importance of the standards and the number of hours spent participating in technology related professional development in the last year. Principals who participated in eleven or more hours of professional development in the last year rated the level of importance of the standards higher than all of the other principals.

Finally, statistical significance existed across Standards II, III, IV, V, and VI between the principals' perceptions of level of importance of the technology standards and participation in an online course. Further analysis revealed that respondents who had taken online courses rated the level of importance of the standards higher than those who had not taken online courses. An analysis of the data revealed no statistical significance

between rating the level of importance of the standards and role in school, the grades in school, and years experience in education.

Ancillary findings revealed statistical significance between principals' interest in professional development and number of hours of participation in technology related professional development in the last year. Statistical significance existed across Standards I, IV, and VI. No other significance was found between the principals' interest in professional development and the other demographic categories.

The qualitative analysis provided a description of implementation of the NETS-A by West Virginia principals identified as effective technology leaders by either the West Virginia Department of Education or the Regional Education Service Agencies. Analysis revealed many similarities within implementation of some standards and a great diversity in implementation of other standards. All principals interviewed started the school day in similar ways. They indicated starting the day by using the computer for tasks like email and communicating with staff via email. All of the principals interviewed also had a strong vision for the school and actively worked to seek resources to move the school forward by providing equipment and professional development.

However, differences appear in levels of use even with email. One school had total electronic communication eliminating announcements over the intercom. The greatest diversity in analyses of the qualitative and quantitative data appeared in Standard II, learning and teaching. The interpretations of technology integration expressed by principals during the interview process were very diverse. On the *Survey of Technology Experiences* principals rated the level of importance of Standard II higher than all other

standards (6.26). Principals also expressed the highest interest in some form of professional development in Standard II (73.8%).

Findings Related to the Literature

Analyses of the data collected in this study provided multiple connections to the literature involving the principals' perceptions of the importance of the technology standards, their interests in professional development, and implementation of these standards by principals identified as effective technology leaders. Major findings related to the literature include: learning and teaching; principals' readiness as technology leaders; and vision and leadership.

Learning and Teaching

The results of this study indicate that West Virginia principals' rate the level of importance of Standard II, learning and teaching, as high importance with a mean score of 6.26. The principals also expressed the highest interest in some form of professional development in Standard II (73.8%). Even though West Virginia principals recognize the importance of technology in learning and teaching, the high interest in professional development indicates that principals recognize a weakness in leadership capacity for using technology in learning and teaching.

Marzano, Waters, and McNulty (2005) performed a meta-analysis to determine what 35 years of research tells about school leadership. The meta-analysis confirmed the school leader's substantial effect on student achievement. The role of the principal as instructional leader is critical and West Virginia principals recognize the importance of their role as indicated in the findings. Since the role of the principal is so important in technology implementation, the Mid-continent Research for Education and Learning

(McREL) developed a solution to integrate technology into the classroom. The solution included building the capacity of school leaders to guide technology integration initiatives (McREL, 2005). The high level of interest in professional development by West Virginia principals indicates a willingness to build the necessary capacity to guide technology initiatives.

The responses of principals interviewed when asked what students would be doing when teachers effectively integrated technology provided evidence of a wide range of technology implementation in schools. Dwyer, Ringstaff, Haymore, and Sandholtz (1997) in the long-term Apple Classrooms of Tomorrow (ACOT) research wrote of the five stages of technology integration: entry, adoption, adaptation, appropriation, and invention. The entry stage includes teachers learning the basics of using a new tool while supporting lecture, seat work, or recitation. The adoption stage supports traditional instruction and may include drill and practice software, keyboarding, and word processing. The adaptation stage integrates the technology into traditional work with a focus on productivity such as word processing, databases, spreadsheets, and graphics. The appropriation stage shows understanding of using the technology as a tool to accomplish real world tasks with a focus on project-based, cooperative, interdisciplinary projects. The invention stage is more student-centered as students invent and combine multiple technology tools to complete student led work.

Principals' responses during interviews indicated that teachers at schools were on all levels of technology integration: entry, adoption, adaptation, appropriation, and invention. Responses provided by principals also indicated that the principals' understanding of technology integration was on all of the levels. Drill and practice

software was cited numerous times as effective technology use by teachers while on the ACOT scale, it falls in the adoption stage of implementation. Professional development at the schools often focused on the tool itself which is on the entry stage of the ACOT scale. Some principals interviewed used examples of effective technology integration that would be on the appropriation or invention stage of the ACOT scale. Several of these examples were included in the narrative descriptions in Chapter 4.

The high rating of Standard II indicates that principals recognized the importance of promoting effective practices in technology integration so that students learn to use higher order thinking skills. The research confirms the importance of using technology for higher order thinking. Critical thinking, research, evaluation, and creativity are needed more than ever for students to be successful. Many of these skills are still underdeveloped in students. Research techniques for gathering information, evaluating information, and drawing conclusions online and offline are crucial in collaborative work (*Horizon Report*, 2006). According to Wenglinsky (2005), teachers' use of technology was important to students. "Using computers to help students work through complex problems, thus tapping higher-order thinking skills produced greater benefits than using computers to drill students on a set of routine tasks" (p. 30).

One of the statements on the *Survey of Technology Experiences* pertaining to Standard II was to participate in professional development with instructional staff for effective technology integration. West Virginia principals rated this standard highest of all standards recognizing the importance of professional development in technology integration. "Virtually every major study of successful technology use finds that teacher professional development is key" (Ringstaff & Kelley, 2002, p. 2). If teachers are trained,

they use technology more often and in a variety of ways. Teachers need to practice the most productive ways to use technology to support learning.

"By taking part in staff development with the staff, principals not only model learning, but also send a powerful message about shared responsibility for school improvement" (Shellard, 2003, p. 9). Principals who participate in school wide professional development on technology integration promote shared leadership for school improvement. Many of the principals interviewed emphasized the importance of professional development in their schools and promoted shared leadership by participating in professional development with staff.

Leadership is the single most important factor affecting the successful integration of technology (*Technology in Schools*, 2002). West Virginia principals (73.8%) expressed an extremely high interest in some form of professional development in Standard II. Principals recognized learning and teaching as high importance (6.26 out of 7) to the role of the principal and recognized a need to improve their capacity to lead successful integration of technology.

Readiness for Technology Leadership

The findings in this study about the professional development interests and needs of West Virginia principals provide information on the readiness of West Virginia principals to provide transformational leadership for systemic change. Technology harnessed with leadership could result in the changes required to meet 21st Century demands. "For public education to benefit from the rapidly evolving development of information and communication technology, leaders at every level – school, district and state – must not only supervise, but provide informed, creative and ultimately

transformative leadership for systemic change" (*Toward a New Golden Age*, 2004, p. 15). Decisions by districts across the nation point to the complex professional development needs in technology integration of administrators since administrative support is the key factor in success (Brooks-Young, 2002).

Technology planning and professional development are critical areas needing principal leadership in making the best choices (Holland, 2000). Findings in this study agree with Holland since principals rated the standards of high importance to the role of the principal and expressed high interest in professional development. One of the most important issues in technology integration is effective leadership and many administrators do not have sufficient training to be comfortable (Gibson, 2001). Not unlike the Allen (2003) study of 374 Ohio principals having statistically significant professional development needs in the area of educational technology, West Virginia principals have indicated a high interest in professional development in technology. More than 50% of West Virginia principals indicated an interest in some form of professional development in every standard of the NETS-A. Standard II, learning and teaching, had 73.8% of West Virginia principals expressing an interest in some form of professional development.

When we look at the readiness of West Virginia principals to provide transformational change in technology integration, the literature provides important information. "All major research on innovation and school effectiveness shows that the principal strongly influences the likelihood of change, but it also indicates that most principals do not play instructional or change leadership roles" (Fullan, 2001b, p. 82). In order to play the instructional or change leadership role as indicated by Fullan, principals in this study indicated a high interest in professional development. The NETS-A identify

the core skills and knowledge necessary for administrators to know how to be effective technology leaders (ISTE, 2002). The professional development needs of West Virginia principals are consistent with the literature.

"An underlying assumption of these standards is that administrators should be competent users of information and technology tools common to information age professionals. The effective 21st Century administrator is a hands-on user of technology" (ISTE, 2002, p. 2). In this study, significant differences in rating the level of importance of the NETS-A to the role of the principals as instructional leaders resulted when compared to technology related demographics. These demographics included: routinely answering email and performing technology related work from home, completion of an online course, and participation in technology related professional development within the last year. Participation in these hands-on technology related experiences increased the principals' capacity to become competent users of information and technology tools resulting in a change in perception of the level of importance of the technology standards.

A top priority of the principalship is for principals to become "role models as technology users and supporters for students, teachers, and support staff" (Heaton & Washington, 1999, p. 4). "Leaders need to model the use of technology to change and improve the environment in which educators function" (Costello, 1997, p. 58). The leader can also use technology in work and use technology to communicate with the teachers while also providing support for teacher involvement in decision making (Cradler et al., 2002). Specific examples of West Virginia principals modeling the use of technology were provided in Chapter Four. One of the principals interviewed spoke about insisting staff use email. This principal indicated that moving to other technologies was an easy

leap after all staff members used email. The large interest in professional development for all standards indicates that principals may not be comfortable as the role model for technology use.

The findings of this study for principals' interest in professional development are consistent with the recommendations for professional development in the study by Kent and the Education Alliance. Kent (2005) evaluated the online survey conducted by the West Virginia Governor's Office of Technology. Professional development was strongly indicated in the survey as an issue since teachers expressed a need for more training. Respondents to that survey indicated that integrating technology is the most pressing professional development need (Kent, 2005). The Education Alliance Report (2005) provided professional development recommendations for administrators. "Provide standards-based technology integration strategies training for school administrators" (p. 7).

According to Byron and Bingham (2001), leaders of schools modeling effective technology integration have six actions in common including: vision, lead by modeling technology use and participation in professional development, support faculty in technology use and risk taking, focus on instruction, use committees to share leadership, and use evaluation. These six actions are closely related to components of all six of the NETS-A. All of these components were on the *Survey of Technology Experiences* and the principals rated all of the standards as high importance to the role of the principal. Since more than 50% of principals indicated an interest in some form of professional development, principals indicate a lack of readiness to model effective technology integration. The qualitative analysis of this study provided a description of

implementation of the NETS-A by principals identified as effective technology leaders. Principals interviewed for this study expressed visions for the school including committees to share the leadership and modeled technology use. Principals participated and even led professional development sessions with a focus on instruction. Principals also used teacher evaluation to encourage technology integration.

The literature confirms the importance of the principal as leader in change, as technology leader in the school, and as the instructional leader of a school. The complex professional development needs of the principals are also identified by the literature as well as this study. In this study, principals in West Virginia rated all of the NETS-A as high importance to the role of the principal as instructional leader. West Virginia principals also expressed high interest in participating in professional development for the NETS-A. Since principals expressed such a large interest in professional development in all standards, they recognize the need to improve their capacity to lead the school in technology integration. The self-reported interest in professional development expressed by principals reveals a willingness to accept the leadership challenge with appropriate professional development.

Vision and Leadership

The focus of Standard I is leadership and vision. The school leader inspires others to share a vision for technology integration while creating a culture conducive for attainment of the vision. As well as facilitating the development of the vision, the leader must create a process for building and maintaining a technology plan to achieve the vision. A culture permeated by promotion of continuous innovation with technology

through risk taking, research, and decision making is important to achieve this standard (ISTE, 2002).

Transformational change in technology integration requires strong leadership. In a study investigating technology leadership with the NETS-A, high school principals in Texas scored the lowest combined mean score on leadership and vision for technology (Seay, 2004). Similarly, West Virginia principals rated the level of importance of Standard I, leadership and vision, as the lowest rated standard. The successful leader sets the direction for the organization by articulating a vision, promoting acceptance of group goals, and setting high expectations (Leithwood, Lewis, Anderson, & Wahlstrom, 2004).

According to Reeves (2006) organizational change can take place when leadership articulates a compelling vision and links the necessary action steps to accomplish the vision. All tasks require articulation and connection to the vision. The leadership and vision standard from this study had a mean score of 5.90. On the 7-point Likert scale this standard is of high importance to the role of the principalship as instructional leader, however principals rated leadership and vision as having a lower importance than all other standards.

"There is a wealth of evidence showing that facilitating change in schools, and especially maintaining that change, depends heavily on capable leadership. It is imperative, therefore, that we focus on leadership for technology in schools if we are to optimize its benefits in learning, teaching, and school operations" (ISTE, 2002, ¶1). Even though West Virginia principals rated this standard of least importance of all the standards, 60.3% of the principals expressed an interest in some level of professional development in leadership and vision. Principals recognize the need to improve their

capacity in providing leadership and promoting a shared vision for effective technology use within the school.

After a study of middle schools, Bridges (2003) concluded that sustaining a shared vision for technology requires the following from the principal: hold high expectations, foster teacher buy-in, expect technology to be used, model expectations, evaluate teachers on technology integration, create shared vision, promote risk taking, and be resourceful in providing technology resources. West Virginia principals identified as effective technology leaders were interviewed and demonstrated these qualities. Strong visions were expressed while working with committees to develop school plans. Principals modeled technology use and expressed high expectations for moving teachers forward in technology integration and productivity. The principals interviewed were especially clever in providing the resources for the schools.

West Virginia principals rated the leadership and vision standard as lowest in importance when compared to the other standards. Since transformational change requires the principal to articulate the vision and promote buy-in by all staff, principals need professional development to assist in understanding the importance and necessity of leadership and vision in implementing technology for learning and teaching.

Implications for Action

The results of this study provide valuable information to guide decision making by West Virginia policymakers, the West Virginia Department of Education 21st Century Skills initiative, designers of professional development, higher education institutions, as well as state, county, and local school districts. An eagerness to learn how to lead transformational change in technology is demonstrated by: 73.8% of principals

expressing interest in some form of professional development in learning and teaching and more than 50% of principals expressing interest in some form of professional development in all standards. The scale of expressed interest and need for technology related professional development requires a comprehensive long-term plan to begin to address the needs of principals. The long-term Apple Classrooms of Tomorrow (ACOT) research documented that technology changes take place over years and require significant professional development (Gordon, 2000). The implementation of a comprehensive plan should include: participation by all stakeholders, time for principal participation, continuous revision of the plan to adapt to changing needs, and extensive professional development over years.

The curriculum for professional development should be carefully designed to provide opportunities in all of the NETS-A. With the high interest in the learning and teaching standard, an emphasis should be placed on technology integration so that principals and teachers understand the different levels of technology integration. The study revealed the wide diversity in the understanding of effective technology integration, reinforcing the need for technology integration professional development. Since the study shows that West Virginia has practicing principals modeling the effective implementation of the NETS-A, principals could share strategies and model best practices as one form of professional development.

Professional development should be provided using multiple strategies and a variety of delivery modes. This study showed a significant difference in rating the level of importance of the standards if the principal participated in an online class. Immersion in the use of technology required for participating in an online class resulted in principals

rating standards higher in importance. Therefore, online professional development should be one mode of delivery. Higher education has demonstrated expertise in creation of online courses and could take the lead in development of this part of the solution to the expressed interest in professional development.

The role of the principal as documented in the literature is critical as the leader of change, the leader of technology reform, and the instructional leader of the school. West Virginia principals recognized the importance of the NETS-A to their role as instructional leader of the school. However, the high interest in professional development signals a lack of readiness or comfort as the leader of change in technology reform in West Virginia. The high interest in professional development also signals a willingness to improve practice and accept the challenging demands of leading systemic change in technology implementation. Therefore stakeholders can use the following recommendations to build the leadership capacity in principals needed to implement systemic technology reform:

1. Find ways to provide adequate time and other incentives for administrators to participate in technology related professional development.
2. Develop guidelines for expenditures of technology dollars to ensure inclusion of appropriate levels of funding for technology related professional development.
3. Develop a long-term comprehensive plan including all stakeholders for extensive technology related professional development with continuous revision of the plan to adapt to changing needs.
4. Design professional development curricula to include all of the NETS-A. Opportunities should be available in a variety of formats and modes of delivery.

5. Provide resources for higher education to create online courses in the NETS-A for principals. Development of online courses in technology integration could promote shared vision in schools by encouraging participation of the principal with the school staff.
6. Provide opportunities for principals recognized as effective technology leaders to share ideas and successes through professional dialogues or observations.

Recommendations for Further Research

Since the role of the principal is vital as the instructional leader of the school, research is important to provide insight into current practices. “Without leadership, the chances for systemic improvement in teaching and learning are nil” (Tirozzi, 2001, p. 438). This study provided some insight into West Virginia principals’ perceptions of the level of importance of technology leadership standards to the role of the principalship as instructional leader, their interest in professional development in these standards, and a description of implementation of these standards by several principals identified as effective technology leaders. The study also raises questions that can only be answered by further research. Recommendations for further research include:

1. This study did not address the kinds of technology related professional development that principals participated in during the past year. Further study could examine the technology related professional development available for principals to determine gaps in available professional development.
2. The qualitative component of this study included interviews with fourteen principals identified as effective technology leaders. This study did not include interviews from intermediate or low technology users. Further research could

capture a description of how all principals implement the technology standards in schools in West Virginia.

3. This study included interviews of principals recommended as effective technology leaders in West Virginia. Further study to provide a more in-depth look at principals identified as effective technology leaders could provide valuable information for improving learning and teaching with technology.
4. Principals indicated allocating money from different sources. Future studies could focus on sources of funding for providing professional development in technology as well as providing resources for schools.
5. Since this study revealed the diversity of levels of technology integration in schools, further study on current levels of technology integration by teachers in West Virginia schools could be useful in promoting systemic change in technology use in schools.
6. Since principals rated the leadership and vision standard lower in level of importance than all the other standards, further study could focus on the leadership and vision standard.

REFERENCES

Allen, J. (2003). A study of the professional development needs of Ohio principals in the area of educational technology. Dissertation Abstracts International. (UMI No. 3093352).

Alreck, P., & Settle, R. (1995). *The survey research handbook: Guidelines and strategies for conducting a survey.* Burr Ridge, IL: Irwin Professional Publishing.

Anderson, R., & Dexter, S. (2005, February). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly, 41*(1), 49-82.

Azzam, A. (2006, April). A generation immersed in media. *Educational Leadership, 63*(7), 92-93.

Babbie, E. (1990). *Survey research methods*. Belmont, CA: Wadsworth Publishing Company.

Bailey, C. (2007). *A guide to qualitative field research.* Thousand Oaks, CA: Pine Forge Press.

Baird-Wilkerson, S. (2003, November). *A monograph on creating organizational change using a living-systems approach*. Regional Educational Laboratory.

Beavers, D. (2001, May/June). Professional development: Outside the workshop box. *Principal Leadership, 1*(9), 43-46.

Bennett, F. (2002). The future of computer technology in K-12 education. *Phi Delta Kappan, 83*(8), 621-625.

Bogdan, R., & Biklen, S. (2003). *Qualitative research for education: An introduction to theories and methods.* Boston, MA: Pearson Education Group, Inc.

Borland, K. (2001). Qualitative and quantitative research: A complementary balance. In R.D. Howard & K. W. Borland (Eds.). *Balancing qualitative and quantitative information for effective decision support* (pp. 5-13). San Francisco, CA: Jossey-Bass.

Bosak, S. (2000, January). All together now: A guide through the collaborative technology jungle. *Electronic School: The School Technology Authority. A Supplement to American School Board Journal, 187*(1), 34-37. Retrieved September 1, 2006, from http://www.electronic-school.com/2000/01/0100toolsofthetrade.html

Bridges, J. (2003). Principal influence: Sustaining a vision for powerful new forms of learning using technology. Dissertation Abstracts International. (UMI 3094211).

Brockmeier, L., Sermon, J., & Hope, W. (2005, June). Principals' relationship with computer technology. *NASSP Bulletin, 8*9(643), 45-63.

Brooks-Young, S. (2002, June). Getting administrators up to speed. *Technology & Learning, 22*(11), 42-44.

Brooks-Young, S. (2002). *Making technology standards work for you. A guide for school administrators*. Eugene, OR: International Society for Technology in Education.

Byrom, E., & Bingham, M. (2001). Factors influencing the effective use of technology for teaching and learning: Lessons learned from the SEIR-TEC Intensive Site Schools. Greensboro, NC: Southeast and Islands Regional Technology in Education Consortium. Retrieved May 16, 2006, from http://www.seirtec.org/publications/lessons.pdf

CEO Forum. (2001, June). *The CEO forum school technology and readiness report: Key building blocks for student achievement in the 21st century*. Retrieved January 14, 2006, from http://www.ceoforum.org

CEO Forum. (1999, February). *The CEO forum school technology and readiness report: Professional development a link to better learning.* Retrieved January 14, 2006, from http://www.ceoforum.org/downloads/99report.pdf

Conyers, J., Kappel, T., & Rooney, J. (1999, February). How technology can transform a school. *Educational Leadership, 56*(5), 82-85.

Copeland, M. (2003, Winter). Leadership of inquiry: Building and sustaining capacity for school improvement. *Education and Policy Analysis, 25*(4), 375-395.

Costello, R.W. (1997). The leadership role in making the technology connection. *T.H.E. Journal, 25*(4), 58-62.

Council of Chief State School Officers. (2000). *Interstate School Leaders Licensure Consortium Standards for School Leaders*. Retrieved May 26, 2006, from http://www.ccsso.org/content/pdfs/isllcstd.pdf

Cradler, J. (2001). *Implementing technology in education: Recent findings from research and evaluation studies*. Retrieved May 26, 2006, from http://www.wested.org/techpolicy/recapproach.html

Cradler, J., Freeman, M., & McNabb, M. (2002, September). Research implications for preparing teachers to use technology. *Learning & Leading with Technology, 30*(1), 50-55.

Cradler, J., McNabb, M., Freeman, M., & Burchett, R. (2002). How does technology influence student learning. *Learning & Leading with Technology, 29*(8), 46-56.

Creswell, J. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches.* Thousand Oaks, CA: Sage Publications.

Culp, K., Honey, M., & Mandinach, E. (2003, October). A retrospective on twenty years of education technology policy. Education Development Center, Center for Children and Technology. Washington, DC: U.S. Department of Education.

CustomInsight. (1998). *Survey random sample calculator.* Retrieved February 3, 2007, from http://www.custominsight.com/articles/random-sample-calculator.asp

Dillman, D. (2000). *Mail and Internet surveys: The tailored design method.* New York, NY: John Wiley & Sons, Inc.

Dillman, D. (1978). *Mail and telephone surveys: The total design method.* New York, NY: John Wiley & Sons, Inc.

Duran, R. (2002). *Technology, education, and at-risk students*: *Educating at-risk students*. Chicago, IL: National Society for the Study of Education.

Dwyer, D., Ringstaff, C., Haymore, J., & Sandholtz, J. (1997). *A report on 10 years of ACOT research*. Retrieved May 19, 2007, from http://images.apple.com/education/k12/leadership/acot/pdf/10yr.pdf

Education Alliance. (2005, November). Closing the achievement gap. Integrating technology in the K-12 classroom: Implications for public policy. Charleston, WV: Author.

Eib, B. (2001). Beyond the bells and whistles: Evaluating technology use in the classroom. *Principal Leadership, 1*(9). 16-23.

Eib, B., & Cox, S. (2003, January). Integrating technology with teacher inquiry. *Principal Leadership, 3*(6), 54-58.

Farkas, S., Johnson, J., & Duffet, A. (2003). *Rolling up their sleeves: superintendents and principals talk about what's needed to fix public schools.* A report from Public Agenda for the Wallace Foundation. Public Agenda, New York, NY.

Ferrandino, V. L. (2001). Challenges for 21st-century elementary school principals. *Phi Delta Kappan, 82*(6). 440-442.

Flanary, R. (2000). Professional development I: Principals. *NASSP Bulletin, 84*(617).

Fowler, F. (2002). *Survey research methods*. Thousand Oaks, CA: Sage Publications.

Fullan, M. (2001a). *Leading in a culture of change*. San Francisco, CA: Jossey-Bass.

Fullan, M. (2001b). *The new meaning of educational change* (3rd Ed.). New York, NY: Teachers College Press.

Fullan, M. (2002, May). The change leader. *Educational Leadership, 59*(8), 16-21.

George, M. (2004, July). Building a technology-rich community. *T.H.E. Journal Online.* Retrieved December 25, 2005, from http://www.thejournal.com/magazine/vault/articleprintversion.cfm?air=4878

Gibson, I. (2001*). The role of school administrators in the process of effectively integrating educational technology into school learning environments: New research from the mid-west*. Proceedings of Society for Information Technology & Teacher Education International Conference, Orlando, FL. (ERIC Document Reproduction Service No. ED457825).

Gordon, D. (2000). *The digital classroom: How technology is changing the way we teach and learn.* Cambridge, MA: The Harvard Education Letter.

Haack, T. (2003, April). Effects of LTTA technology training on the perceptions of Nebraska school principals about their ability to satisfy technology skills and national teacher and administrator standards. Dissertation Abstracts International.

Hall, M. (2000, March/April). Better accountability through technology. *Thrust for Educational Leadership, 29*(4), 29.

Halverson, R. (2004, November). Accessing, documenting, and communicating practical wisdom: The phronesis of school leadership practice. *American Journal of Education. 111*(1), 90-121.

Harris, A., & Chapman, C. (2002, June). *Effective leadership in schools facing challenging circumstances.* Nottingham, UK: National College for School Leadership.

Heaton, L.A., & Washington, L.A. (1999). *Developing technology training for principals*. Paper presented at the Annual Meeting of the American Educational Research Association, Quebec, Canada. (ERIC Document Reproduction Service No. ED429588)

Hitlin, P., & Rainie, L. (2005, August). *Teens, technology, and school*. Retrieved May 26, 2006, from http://www.pewinternet.org

Holland, L. (2000, September/October). A different divide: Preparing tech-savvy leaders. *Leadership, 30*(1), 8-12.

The Horizon Report. (2006). The New Media Consortium. Retrieved January 15, 2006, from http://www.nmc.org/pdf/2006_Horizon_Report.pdf

Institute for Educational Leadership. (2000, October). *Leadership for student learning: Reinventing the principalship*. Washington, DC: Institute for Educational Leadership.

International Society for Technology in Education. (2002). National educational technology standards for administrators. Retrieved November 15, 2005, from http://cnets.iste.org/administrators/pdf/NETSA_Standards.pdf

Jonassen, D., Howland, J., Moore, J., & Marra, R. (2003). *Learning to solve problems with technology.* Upper Saddle River, NJ: Merrill Prentice Hall.

Kent, C. (2005, June). *An evaluation of technology in West Virginia schools: Results from a teacher and student survey*. Report prepared for the Director of Education Technology, State of West Virginia, Charleston, WV.

Kimble, C. (1999, May). *The impact of technology on learning: Making sense of the research* [policy brief]. Aurora, CO: Mid-continent Regional Laboratory.

Lemke, C. (2005, April). Measuring progress with technology in schools. *T.H.E. Journal Online*. Retrieved December 15, 2005, from http://www.thejournal.com/magazine/vault/articleprintversion.cfm?aid=5315

Lezotte, L., & McKee, K. (2002). *Assembly required: A continuous school improvement system.* Okemos, MI: Effective Schools Products, Ltd.

Leithwood, K., Lewis, K., Anderson, S., & Wahlstrom, K. (2004). How leadership influences student learning: A review of research. *Center for Applied Research and Educational Improvement*, Minneapolis, MN, and Ontario Institute for Studies in Education, Toronto, Ontario, Canada.

Levin, D., & Arafeh, S. (2002). *The digital disconnect: The widening gap between Internet-savvy students and their schools.* A Report for the Pew Internet and American Life Project, Washington, DC.

Marzano, R. (2003). *What works in schools.* Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R., Waters, T., & McNulty, B. (2005). *School leadership that works: From research to results.* Alexandria, VA: Association for Supervision and Curriculum Development.

McKenzie, J. (1999). *How teachers learn technology best*. Bellingham, WA: FNO Press.

Mid-continent Research for Education and Learning. (2005, Summer). *Integrating technology into the classroom: McREL technology solutions*. *Changing Schools.* Aurora, CO: Author.

Mid-continent Research for Education and Learning. (2001, Winter). Making connections: Integrating technology in the classroom. *Changing Schools.* Aurora, CO: Author.

National Center for Educational Statistics. (2005). *Revenues and Expenditures for Public Elementary and Secondary Education: School year 2002-2003* (NCES 2005-353). Retrieved August 31, 2006, from http://nces.ed.gov/fastfacts/display.asp?id=66

O'Dwyer, L., Russell, M. & Bebell, D. (2004, September 14). Identifying teacher, school and district characteristics associated with elementary teachers' use of technology: A multilevel perspective. *Education Policy Analysis Archives, 12*(48). Retrieved May 26, 2006 from http://epaa.asu.edu/epaa/v12n48

Ogawa, R., Sandholtz, J., Martunez-Flores, M., & Scribner, S. (2003). The substantive and symbolic consequences of a district's standards-based curriculum. *American Educational Research Journal, 40*(1), 147-176.

O'Neill, J., & Conzemius, A. (2002, Spring). Four keys to a smooth flight. *Journal of Staff Development, 23*(2), 14-18.

Partnership for 21st Century Schools. (2006, March). *Results that matter: 21st century skills and high school reform*. Retrieved May 26, 2006, from http://www.21stcenturyskills.org

Petzko, V. (2002, June). Leaders and leadership in middle schools. *NASSP Bulletin 86*(631), 3-15.

Pflaum, W. (2004). *The technology fix: The promise and realities of computers in our schools.* Alexandria, VA: Association for Supervision and Curriculum Development.

Piper, D. (2000, May). Facilitating change: Factors influencing teachers' practices of using computers in the classroom. Dissertation Abstracts International. (UNI No. 9959145).

Reeves, D. (2006). *The learning leader: How to focus school improvement for better results*. Alexandria, VA: Association for Supervision and Curriculum Development.

Ringstaff, C., & Kelley, L. (2002). *The learning return on our educational investment: A review of findings from research*. Retrieved May 29, 2006, from http://www.wested.org

Schoeny, Z., Heaton, L., & Washington, L. (1999). Perceptions and educational technology needs of school administrators. Society for Information Technology & Teacher Education International Conference (10th, San Antonio, TX, February 28-March 4, 1999).

Schrum, L. (2005, Spring). A proactive approach to a research agenda for educational technology. *Journal of Research on Technology in Education, 37*(3), 217-220.

Schwandt, T. (2001). *Dictionary of qualitative inquiry*. Thousand Oaks, CA: Sage Publications.

Seay, A. (2004). A study of the technology leadership of Texas high school principals. Dissertation International Abstracts. (UMI No. 3126588).

Sharp, W. (1998, September). School administrators need technology too. *T.H.E. Journal, 26*(2), 75-76.

Shellard, E. (2003). Redefining the role of the principal. *The Informed Educator Series, Educational Research Service*, Arlington, VA.

Shelly, R. (2000). From literacy to fluency in instructional technology: Taking your staff to the next level. *National Association of Secondary Principals. 84(*614*).*

Sinden, J., Hoy, W., & Sweetland, S. (2004, March). Enabling school structures: Principal leadership and organizational commitment of teachers. *Journal of School Leadership, 14*(2), 195-210.

Sparks, D. (2003, October). *Results: Significant change begins with leaders*. Retrieved September 1, 2006, from http://www.nsdc.org

State Educational Technology Directors. (2005). *2005 National Trends Report*. Retrieved on December 15, 2005, from http://www.setda.org/content.cfm?section ID=185

Technology in schools suggestions, tools, and guidelines for assessing technology in elementary and secondary education. (2002). National Forum on Education Statistics.

Tirozzi, G. (2001, February). The artistry of leadership: The evolving role of the secondary school principal. *Phi Delta Kappan, 82*(6), 434-440.

Todd, R. (1999). Transforming leadership and transformational learning: Information literacy and the World Wide Web. *National Association of Secondary Principals, 83*(605).

Toward a new golden age in American education: How the Internet, the law and today's students are revolutionizing expectations. (2004). Retrieved December 5, 2005, from http://www.ed.gov/print/about/offices/list/os/technology/plan/2004/plan.html

U.S. Department of Education. (2004). National Educational Technology Plan. Retrieved May 26, 2006, from http://www.ed.gov

Wenglinsky, H. (2005-2006, December/January). Technology and achievement: The bottom line. *Educational Leadership, 63*(4), 29-32.

West Virginia Department of Education. (2005, May). *National report ranks West Virginia as a leader in instructional technology*. Retrieved July 19, 2005, from http://wvde.state.wv.us/news/987

West Virginia Department of Education. (2002-06). *West Virginia educational technology plan.* Retrieved May 26, 2006, from http://access.k12.wv.us/techplan/stateplan.htm

Zhao, Y., Pugh, K., Sheldon, S., & Byers, J. (2002, April). Conditions for classroom technology innovations. *Teachers College Record, 104*(3), 482-515.

APPENDICES

Appendix A: National Educational Technology Standards for Administrators

National Educational Technology Standards for Administrators

ISTE National Educational Technology Standards (NETS) and Performance Indicators for Administrators (Developed by the TSSA Collaborative and adopted by ISTE NETS)

I. Leadership and Vision

Educational leaders inspire a shared vision for comprehensive integration of technology and foster an environment and culture conducive to the realization of that vision.
Educational leaders:

A. facilitate the shared development by all stakeholders of a vision for technology use and widely communicate that vision.
B. maintain an inclusive and cohesive process to develop, implement, and monitor a dynamic, long-range, and systemic technology plan to achieve the vision.
C. foster and nurture a culture of responsible risk-taking and advocate policies promoting continuous innovation with technology.
D. use data in making leadership decisions.
E. advocate for research-based effective practices in use of technology.
F. advocate, on the state and national levels, for policies, programs, and funding opportunities that support implementation of the district technology plan.

II. Learning and Teaching

Educational leaders ensure that curricular design, instructional strategies, and learning environments integrate appropriate technologies to maximize learning and teaching.
Educational leaders:

A. identify, use, evaluate, and promote appropriate technologies to enhance and support instruction and standards-based curriculum leading to high levels of student achievement.
B. facilitate and support collaborative technology-enriched learning environments conducive to innovation for improved learning.
C. provide for learner-centered environments that use technology to meet the individual and diverse needs of learners.
D. facilitate the use of technologies to support and enhance instructional methods that develop higher-level thinking, decision-making, and problem-solving skills.
E. provide for and ensure that faculty and staff take advantage of quality professional learning opportunities for improved learning and teaching with technology.

III. Productivity and Professional Practice

Educational leaders apply technology to enhance their professional practice and to increase their own productivity and that of others.
Educational leaders:

A. model the routine, intentional, and effective use of technology.
B. employ technology for communication and collaboration among colleagues, staff, parents, students, and the larger community.

C. create and participate in learning communities that stimulate, nurture, and support faculty and staff in using technology for improved productivity.
D. engage in sustained, job-related professional learning using technology resources.
E. maintain awareness of emerging technologies and their potential uses in education.
F. use technology to advance organizational improvement.

IV. Support, Management, and Operations

Educational leaders ensure the integration of technology to support productive systems for learning and administration.

Educational leaders:

A. develop, implement, and monitor policies and guidelines to ensure compatibility of technologies.
B. implement and use integrated technology-based management and operations systems.
C. allocate financial and human resources to ensure complete and sustained implementation of the technology plan.
D. integrate strategic plans, technology plans, and other improvement plans and policies to align efforts and leverage resources.
E. implement procedures to drive continuous improvements of technology systems and to support technology replacement cycles.

V. Assessment and Evaluation

Educational leaders use technology to plan and implement comprehensive systems of effective assessment and evaluation.

Educational leaders:

A. use multiple methods to assess and evaluate appropriate uses of technology resources for learning, communication, and productivity.
B. use technology to collect and analyze data, interpret results, and communicate findings to improve instructional practice and student learning.
C. assess staff knowledge, skills, and performance in using technology and use results to facilitate quality professional development and to inform personnel decisions.
D. use technology to assess, evaluate, and manage administrative and operational systems.

VI. Social, Legal, and ethical Issues

Educational leaders understand the social, legal, and ethical issues related to technology and model responsible decision-making related to these issues.

Educational leaders:

A. ensure equity of access to technology resources that enable and empower all learners and educators.
B. identify, communicate, model, and enforce social, legal, and ethical practices to promote responsible use of technology.

C. promote and enforce privacy, security, and online safety related to the use of technology.
D. promote and enforce environmentally safe and healthy practices in the use of technology.
E. participate in the development of policies that clearly enforce copyright law and assign ownership of intellectual property developed with district resources.

(National Educational Technology Standards for Administrators, published by the International Society for Technology in Education, (ISTE), NETS Project, copyright 2002, ISTE, 800.336.5191).

Appendix B: Survey of Technology Experiences

SURVEY OF TECHNOLOGY EXPERIENCES

Part I. Following is a list of technology related statements. In Column A, please rate the level of importance each statement is to the role of the principalship on a scale of 1 to 7 with:

1 = Not Important (I do not think this is important at all to the job of the principal.)
4 = Important
7 = Very Important (I think this is essential for a principal as an instructional leader.)

In Column B, please indicate your interest in professional development on the topic by marking yes or no.

	I believe that a principal should:	Column A Level of Importance 1 = Not Important 4 = Important 7 = Very Important	Column B Are you interested in professional development on this topic?
1	participate in a district wide process for developing a shared vision for technology use.	1 2 3 4 5 6 7	Yes No
2	work with staff to develop a technology-rich school improvement plan grounded in research.	1 2 3 4 5 6 7	Yes No
3	support a strong technology committee within the school.	1 2 3 4 5 6 7	Yes No
4	promote effective practices in technology integration to improve instruction.	1 2 3 4 5 6 7	Yes No
5	provide teachers with technology to design, assess, and modify student instruction.	1 2 3 4 5 6 7	Yes No
6	participate in professional development with instructional staff for effective technology integration.	1 2 3 4 5 6 7	Yes No
7	use current technology-based management systems to maintain personnel and student records.	1 2 3 4 5 6 7	Yes No
8	use email to communicate with at least two groups of stakeholders: teachers, parents, community, or peers.	1 2 3 4 5 6 7	Yes No
9	use telecommunications and/or the school website to communicate and collaborate with others.	1 2 3 4 5 6 7	Yes No
10	provide school-wide technology professional development for sharing ideas and resources.	1 2 3 4 5 6 7	Yes No
11	allocate discretionary funds and resources to advance implementation of the school technology plan.	1 2 3 4 5 6 7	Yes No

Please continue on the back of this page.

	I believe that a principal should:	Column A Level of Importance 1 = Not Important 4 = Important 7 = Very Important	Column B Are you interested in professional development on this topic?
12	advocate for adequate, timely, and high-quality technology support services.	1 2 3 4 5 6 7	Yes No
13	promote and model technology use analyzing data improving student learning and productivity.	1 2 3 4 5 6 7	Yes No
14	guide teacher professional development toward individual growth in technology.	1 2 3 4 5 6 7	Yes No
15	include effective technology use as one criterion in assessing performance of instructional staff.	1 2 3 4 5 6 7	Yes No
16	secure and allocate technology resources to enable teachers to meet the needs of all learners.	1 2 3 4 5 6 7	Yes No
17	enforce an "Acceptable Use Policy" and other policies related to security, copyright, and technology use.	1 2 3 4 5 6 7	Yes No
18	participate in planning a focus on healthy and safe practices related to technology use.	1 2 3 4 5 6 7	Yes No

Part II. Based on your current job, please complete the following.

1. I am currently a(n): ☐ Assistant Principal ☐ Principal ☐ Neither

2. I routinely access email and do work related technology activities from home.
☐ Yes ☐ No ☐ No Computer

3. In the last year I have participated in technology related professional development for:

☐ None ☐ Less than 1 hr ☐ Between 1 - 4 hrs ☐ Between 5 - 10 hrs ☐ 11 hrs or more

4. I have taken an online course.
☐ Yes ☐ No

5. The grade levels in my school are: _____

6. I have worked in education for: _____ years.

Thank you for participating in this study.

If you have lost or misplaced the return envelope, please mail to:
Dixie Billheimer
2637 Washington Blvd.
Huntington, WV 25705

Appendix C: Support for Technology Leadership Concepts

Support for Technology Leadership Concepts

Organizations, Authors, and Research Studies Identifying Common Technology Leadership Concepts in This Literature Review	Leadership and Vision	Learning and Teaching	Productivity and Professional Practice	Support, Management, and Operations	Assessment and Evaluation	Social, Legal, and Ethical
International Society for Technology in Education (ISTE)*	X	X	X	X	X	X
Technology Standards for School Administrators Collaborative (TSSA)	X	X	X	X	X	X
Anderson and Dexter Study	X	X	X	X	X	X
Byron and Bingham Study	X	X	X	X	X	X
Culp, Honey, and Mandinach Report	X	X	X	X	X	X
Ogawa, Sandholtz, Martinez-Flores, and Scribner Study	X	X	X	X	X	
Lezotte and McKee	X	X	X	X	X	X
West Virginia Educational Technology Plan (2002-2006)	X	X	X	X	X	X
State Educational Technology Directors Association (SETDA)	X	X	X	X	X	X
Utah's School (T-Plus) Project	X	X	X	X	X	X
Interstate School Leaders Licensure Consortium (ISLLC)	X	X	X	X	X	X

* (ISTE NETS-A project partners included: American Association of School Librarians, American Federation of Teachers, Association for Supervision and Curriculum Development, The Council of Chief State School Officers, Council for Exceptional Children, International Society for Technology in Education, National Association of Elementary Principals, National Association of Secondary School Principals, National Council for Accreditation for Teacher Education, National Education Association, The National Education Association Foundation for the Improvement of Education, National School Boards Association's Education Technology Programs, Public Broadcasting Service, and Software & Information Industry Association.)

Appendix D: Performance Profiles for Principals

ISTE National Educational Technology Standards (NETS) and Performance Indicators for Administrators (Developed by the TSSA Collaborative and adopted by ISTE NETS)

NETS for Administrators

Profiles for Technology-Literate Administrators

Principal Profile

Principals who effectively lead integration of technology typically perform the following tasks. Effective principals:

I. Leadership and Vision

1. participate in an inclusive district process through which stakeholders formulate a shared vision that clearly defines expectations for technology use.
2. develop a collaborative, technology-rich school improvement plan, grounded in research and aligned with the district strategic plan.
3. promote highly effective practices in technology integration among faculty and other staff.

II. Learning and Teaching

4. assist teachers in using technology to access, analyze, and interpret student performance data, and in using results to appropriately design, assess, and modify student instruction.
5. collaboratively design, implement, support, and participate in professional development for all instructional staff that institutionalizes effective integration of technology for improved student learning.

III. Productivity and Professional Practice

6. use current technology-based management systems to access and maintain personnel and student records.
7. use a variety of media and formats, including telecommunications and the school website, to communicate, interact, and collaborate with peers, experts, and other education stakeholders.

IV. Support, Management, and Operations

8. provide campus-wide staff development for sharing work and resources across commonly used formats and platforms.
9. allocate campus discretionary funds and other resources to advance implementation of the technology plan.
10. advocate for adequate, timely, and high-quality technology support services.

V. Assessment and Evaluation

11. promote and model the use of technology to access, analyze, and interpret campus data to focus efforts for improving student learning and productivity.
12. implement evaluation procedures for teachers that assess individual growth toward established technology standards and guide professional development planning.
13. include effectiveness of technology use in the learning and teaching process as one criteria in assessing performance of instructional staff.

VI. Social, Legal, and Ethical Issues

14. secure and allocate technology resources to enable teachers to better meet the needs of all learners on campus.
15. adhere to and enforce among staff and students the districts acceptable use policy and other policies and procedures related to security, copyright, and technology use.
16. participate in the development of facility plans that support and focus on health and environmentally safe practices related to the use of technology.

(National Educational Technology Standards for Administrators, published by the International Society for Technology in Education, (ISTE), NETS Project, copyright 2002, ISTE, 800.336.5191).

Appendix E: Panel of Experts

Panel of Experts

Name, Position Title, Place of Employment, City, State

1. Cheryl Belcher, Coordinator in School and School System Improvement, West Virginia Department of Education, Charleston, WV
2. Deborah Clark, WV Codirector/Math Content Specialist Coalfield Rural Systemic Initiative, Edvantia, Inc., Charleston, WV
3. Dr. Mike Cunningham, Professor & Program Director Leadership Studies, Marshall University Graduate School of Education and Professional Development, South Charleston, WV
4. Dr. Teresa Eagle, Professor & Coordinator of Doctoral Programs, Marshall University Graduate School of Education and Professional Development, South Charleston, WV
5. Dr. Patricia Kusimo, CEO, West Virginia Center for Professional Development, Charleston, WV
6. Dr. Karen Larry, Executive Assistant to the State Superintendent, West Virginia Department of Education, Charleston, WV
7. Paula Staley, Assistant Director Office of Adult Education and Workforce Development, West Virginia Department of Education, Charleston, WV
8. Dr. Sue Hollandsworth, Assistant to the Dean of Graduate Education, Marshall University Graduate School of Education and Professional Development, South Charleston, WV

Appendix F: Content Validity Questions

Content Validity Questions

1. Will the words be uniformly understood?
2. Do the questions contain abbreviations or unconventional phrases?
3. Are the questions too vague?
4. Is the question too precise?
5. Is the question biased?
6. Is the question objectionable?
7. Is the question too demanding?
8. Is it a double question?
9. Does the question have a double negative?
10. Are the answer choices mutually exclusive?
11. Has the researcher assumed too much knowledge?
12. Has too much been assumed about respondent behavior?
13. Is the question technically accurate?

(Dillman, 1978, pp. 99-114).

Appendix G: Interview Protocol

Interview Protocol

The telephone contact to ask permission to interview will include an opening with the verbal consent. Hello, my name is Dixie Billheimer. You have been recommended as an effective technology leader to be in a study about technology. This study involves research. The purpose of this research study is to find out what effective technology usage looks like in West Virginia. This will take about twenty minutes of your time. If you choose to be in the study, I will ask you some questions and you will answer the questions based on your experiences.

There are no foreseeable risks or benefits to you for participating in this study. There is no cost or payment to you. If you have questions while taking part, please stop me and ask. Your answers are completely confidential. Data will be reported in aggregate form only with no identification of individuals.

If you have questions about this research study you may call me at 523-8580. If you have questions concerning your rights as a research participant call the Marshall University Office of Research Integrity (ORI) at (304) 696-7320.

Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to stop. May I continue?

Interview:
Introductions will include special thanks for the time spent talking to the interviewer.

- Request permission to tape the interview
- Explain the purpose of the study.
- Guarantee confidentiality
- Remind the participant that participation is entirely voluntary and there is no penalty for nonparticipation.
- At any time the participant may stop the interview.
- Assure the participant that the Marshall University Institutional Review Board of the Office of Research Integrity approved the study.

Questions are divided into clusters so that the interviewer may choose questions as needed.

1. Please walk me through your day as a principal and tell me how technology impacts that day.
2. What role did you play in the development of the district and school technology plan?
3. Please share some examples of effective technology use by teachers in your school and tell how you were able to support them.
4. How do you model effective technology use in your school?
5. How do you utilize technology to support your management related tasks in school?
6. Please describe the school-wide technology related staff developments you had in the last year.
7. How do you support technology integration in teaching and learning in your school?
8. How are you able to secure and allocate resources for technology integration in teaching and learning?
9. When conducting teacher evaluations, what do you look for and how do you determine effective technology use and integration?
10. What kinds of policies and practices do you have related to security, copyright, and technology use?
11. Please share anything else you would like to tell me concerning technology in your school or about the direction you would like to take your school with technology.

Thank the principal for the time and assure him or her of how important the responses are to gain a description of technology in West Virginia schools and the role of the principal.

Appendix H: Cover Letter for Survey

Date

Name
Address

Dear **Name**,

My name is Dixie Billheimer and I am a doctoral student in Curriculum and Instruction at Marshall University. I am writing to ask your help in a study of West Virginia principals being conducted as part of the requirements for completing my doctorate. Your opinions will be very important to the success of the study.

It is my understanding that you have experience in serving as a principal or assistant principal. Your name was selected randomly from a list of West Virginia principals and assistant principals. The survey will ask your opinion about the importance of technology and your interest in technology related professional development.

Your answers are completely confidential. Data will be reported in aggregate form only with no identification of individuals. The identifying number on the survey will only be used as a method to send follow-up surveys to nonresponders. When you return your completed survey, your name will be deleted from the mailing list. Your name is not connected to your answers in any way. This survey is completely voluntary and you may decline to participate without penalty. If you have any questions concerning your rights as a research participant you may contact the Marshall University Office of Research Integrity at (304) 696-7320.

Results from the survey will be used to help make decisions about technology and professional development needs. If you would like to receive more information about the results of the survey, please write your name and mailing address on the return envelope, not the survey, to ensure confidentiality. If you have additional questions, you may contact me at 304-523-8580 or by email at dbillhei@marshall.edu.

Please answer all questions as honestly and accurately as possible. Please return all responses by **DATE** in the enclosed, stamped self-addressed envelope. Please accept my gratitude in advance for your cooperation and timely participation in this research study.

Sincerely,

Dixie Billheimer

Appendix I: Postcard Reminder

DATE

Last week a survey seeking your opinion about the importance of technology and your interest in technology related professional development was mailed to you. Your name was selected randomly from a list of West Virginia principals and assistant principals.

If you have already completed and returned the survey, please accept my sincere thanks. If not, please do so by **DATE**. I am especially appreciative for your help because when people like you share your experiences and opinions, we can understand the importance of technology to principals and the professional development interests.

If you did not receive a survey, or if it was misplaced, please contact me at 304-523-8580 or by email at dbillhei@marshall.edu and another one will be mailed to you.

Dixie Billheimer

Appendix J: Cover Letter for Replacement Survey

DATE

NAME
ADDRESS

Dear **NAME**,

About three weeks ago I sent a survey to you that asked about your opinions on the importance of technology to the principalship and your interest in technology related professional development. My records indicate that your survey has not been returned. If you have already returned the survey, please disregard this letter.

The results of the survey will be very useful to state leaders and others. While your participation is voluntary, your response will greatly increase the strength of the study. Although I sent surveys around the state, it is important to hear from everyone in the sample so that the results are representative of the entire state.

Protecting the confidentiality of every person is important to me. The survey identification number is printed on the corner so that I can check your name off the mailing list when it is returned. The list is then destroyed so that individual names cannot be connected to the results in any way. Your participation is purely voluntary and there is no penalty for declining to participate.

I hope that you will fill out and return the survey by **DATE** using the stamped, self-addressed envelope. Please contact me at 304-523-8580 or by email at dbillhei@marshall.edu if you have any questions or would like additional information about this study.

Thank you very much for taking time from your busy schedule to help with this important study.

Sincerely,

Dixie Billheimer

Appendix K: Marshall University Institutional Review Board Documents

MARSHALL UNIVERSITY
www.marshall.edu

Office of Research Integrity
Institutional Review Board

Friday, March 16, 2007

Lisa A. Heaton, Ph.D.
Education and Professional Development
100 Angus E. Peyton Dr.
South Charleston, WV. 25303

RE: IRB Study # EX07-0118 **At:** Marshall IRB 2

Dear Dr. Heaton:

Protocol Title:
A Study of WV Principals: Technology Standards, Professional Development, and Effective Instructional Technology Leaders

Expiration Date:	3/15/2008	
Our Internal #:	3340	
Type of Change:	(Other)	Exempted
Expedited ?:		
Date of Change:	3/16/2007	
Date Received:	3/16/2007	
On Meeting Date:		
Description:	In accordance with 45CFR46.101(b)(2), the above study and informed consent were granted Exempted approval today by the Marshall University IRB#2 Chair for the period of 12 months. The approval will expire 3/15/08. A continuing review request for this study must be submitted no later than 30 days prior to the expiration date. This study is for student Dixie Billheimer. The purpose of this study is to (1) determine how WV principals rate the level of importance of the National Educational Technology Standards for Administrators (NETS-A), (2) determine WV principals' interest in professional development related to the NETS-A, and (3) describe the implementation of the NETS-A by WV principals identified as effective technology leaders.	

Respectfully yours,

Stephen D. Cooper, Ph.D.
Marshall University IRB#2 Chairperson

Date

Name
Address

Dear **Name**,

My name is Dixie Billheimer and I am a doctoral student in Curriculum and Instruction at Marshall University. I am writing to ask your help in a study of West Virginia principals being conducted as part of the requirements for completing my doctorate. Your opinions will be very important to the success of the study.

It is my understanding that you have experience in serving as a principal or assistant principal. Your name was selected randomly from a list of West Virginia principals and assistant principals. The survey will ask your opinion about the importance of technology and your interest in technology related professional development.

Your answers are completely confidential. Data will be reported in aggregate form only with no identification of individuals. The identifying number on the survey will only be used as a method to send follow-up surveys to nonresponders. When you return your completed survey, your name will be deleted from the mailing list. Your name is not connected to your answers in any way. This survey is completely voluntary and you may decline to participate without penalty. If you have any questions concerning your rights as a research participant you may contact the Marshall University Office of Research Integrity at (304) 696-7320.

Results from the survey will be used to help make decisions about technology and professional development needs. If you would like to receive more information about the results of the survey, please write your name and mailing address on the return envelope, not the survey, to ensure confidentiality. If you have additional questions, you may contact me at 304-523-8580 or by email at dbillhei@marshall.edu.

Please answer all questions as honestly and accurately as possible. Please return all responses by **DATE** in the enclosed, stamped self-addressed envelope. Please accept my gratitude in advance for your cooperation and timely participation in this research study.

Sincerely,

Dixie Billheimer

Interview Protocol

The telephone contact to ask permission to interview will include an opening with the verbal consent. Hello, my name is Dixie Billheimer. You have been recommended as an effective technology leader to be in a study about technology. This study involves research. The purpose of this research study is to find out what effective technology usage looks like in West Virginia. This will take about twenty minutes of your time. If you choose to be in the study, I will ask you some questions and you will answer the questions based on your experiences.

There are no foreseeable risks or benefits to you for participating in this study. There is no cost or payment to you. If you have questions while taking part, please stop me and ask. Your answers are completely confidential. Data will be reported in aggregate form only with no identification of individuals.

If you have questions about this research study you may call me at 523-8580. If you have questions concerning your rights as a research participant call the Marshall University Office of Research Integrity (ORI) at (304) 696-7320.

Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to stop. May I continue?

Interview:
Introductions will include special thanks for the time spent talking to the interviewer.

- Request permission to tape the interview
- Explain the purpose of the study.
- Guarantee confidentiality
- Remind the participant that participation is entirely voluntary and there is no penalty for nonparticipation.
- At any time the participant may stop the interview.
- Assure the participant that the Marshall University Institutional Review Board of the Office of Research Integrity approved the study.

Questions are divided into clusters so that the interviewer may choose questions as needed.

Informed Consent to Participate in a Research Study

A STUDY OF WEST VIRGINIA PRINCIPALS: TECHNOLOGY STANDARDS, PROFESSIONAL DEVELOPMENT, AND EFFECTIVE INSTRUCTIONAL TECHNOLOGY LEADERS

Lisa Heaton, Ph.D., Principal Investigator

Introduction

You are invited to be in a research study. Research studies are designed to gain scientific knowledge that may help other people in the future. You may or may not receive any benefit from being part of the study. There may also be risks associated with being part of research studies. Your participation is voluntary. Please take your time to make your decision, and ask your research investigator or research staff to explain any words or information that you do not understand.

Why Is This Study Being Done?

The purpose of this study is to determine how West Virginia principals rate the level of importance of the National Educational Technology Standards – Administrators (NETS-A), to determine West Virginia principals' interest in professional development related to the NETS-A, and to describe the implementation of the NETS-A by West Virginia principals identified as effective technology leaders.

How Many People Will Take Part In The Study?

About 673 participants will take part in the survey part of the study and about 20 participants will take part in the interview process in this study. A total of 695 subjects are the most that would be able to enter the study through survey or interview.

What Is Involved In This Research Study?

For the interview portion of the study, you will be asked some questions based on your experiences as an administrator. The interview should take about twenty minutes of your time. You were recommended by either the West Virginia Department of Education or the Regional Education Service Agency. You were recommended as a West Virginia principal who is an effective technology leader. Your answers will be important to provide data for the study. All participants will be guaranteed confidentiality. You may decline the interview or stop the interview at any time without penalty. Your name will not be linked to the data and the data will only be presented in aggregate form.

MU IRB
SDC
APPROVED

Subject's Initials _____

How Long Will You Be In The Study?

You will be in the study until we have completed the interview or if you would decide not to complete the interview.

You can decide to stop participating at any time. If you decide to stop participating in the study we encourage you to talk to the study investigator or study staff as soon as possible.

The study investigator may stop you from taking part in this study at any time if he/she believes it is in your best interest; if you do not follow the study rules; or if the study is stopped.

What Are The Risks Of The Study?

There are no known risks to those who take part in this study.

Are There Benefits To Taking Part In The Study?

If you agree to take part in this study, there may or may not be direct benefit to you. We hope the information learned from this study will benefit other people in the future. The benefits of participating in this study may be: to provide information for decision makers in education pertaining to technology professional development or for decision making for higher education, state, county, and local agencies pertaining to technology.

What About Confidentiality?

We will do our best to make sure that your personal information is kept confidential. However, we cannot guarantee absolute confidentiality. Federal law says we must keep your study records private. Nevertheless, under unforeseen and rare circumstances, we may be required by law to allow certain agencies to view your records. Those agencies would include the Marshall University IRB, Office of Research Integrity (ORI) and the federal Office of Human Research Protection (OHRP). This is to make sure that we are protecting your rights and your safety. If we publish the information we learn from this study, you will not be identified by name or in any other way.

What Are The Costs Of Taking Part In This Study?

There are no costs to you for taking part in this study. All the study costs, including any study tests, supplies and procedures related directly to the study, will be paid for by the study.

Subject's Initials _____

Will You Be Paid For Participating?

You will receive no payment or other compensation for taking part in this study.

What Are Your Rights As A Research Study Participant?

Taking part in this study is voluntary. You may choose not to take part or you may leave the study at any time. Refusing to participate or leaving the study will not result in any penalty or loss of benefits to which you are entitled. If you decide to stop participating in the study we encourage you to talk to the investigators or study staff first.

Whom Do You Call If You Have Questions Or Problems?

For questions about the study, contact the study investigator, Dixie Billheimer at 304-523-8580. You should also call the investigator if you have a concern or complaint about the research.

For questions about your rights as a research participant, contact the Marshall University IRB#2 Chairman Dr. Stephen Cooper or ORI at (304) 696-7320. You may also call this number if:

- You have concerns or complaints about the research.
- The research staff cannot be reached.
- You want to talk to someone other than the research staff.

You will be given a signed and dated copy of this consent form.

SIGNATURES

You agree to take part in this study and confirm that you are 18 years of age or older. You have had a chance to ask questions about being in this study and have had those questions answered. By signing this consent form you are not giving up any legal rights to which you are entitled.

_____
Subject Name (Printed)

_____ _____
Subject Signature Date

_____
Person Obtaining Consent (Printed)

_____ _____
Person Obtaining Consent Signature Date

Subject's Initials _____

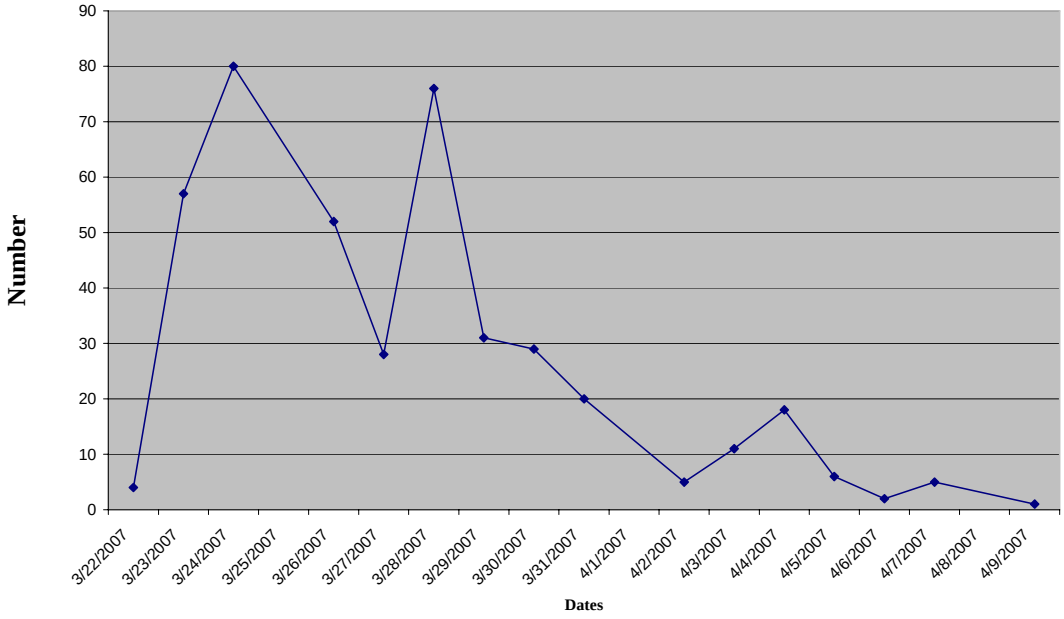
Appendix L: Demographics for Interviews

Demographic Data for Interviews

	Male	Female	Elementary	Middle	High School	Northern	Southern	Eastern	Western
P1		*			*		*		
P2		*	*				*		
P3	*				*				*
P4	*			*					*
P5		*		*				*	
P6	*			*			*		
P7		*	*			*			
P8	*			*		*			
P9	*		*						*
P10		*	*						*
P11	*			*				*	
P12		*	*			*			
P13	*		*					*	
P14	*				*			*	

Appendix M: Return Rate Graph

Return Rate Graph



CURRICULUM VITAE

Dixie M. Billheimer

dbillhei@marshall.edu

Academic Degrees

Doctor of Education in Curriculum and Instruction (EdD), 2007
Marshall University
Emphasis: Instructional Technology

Education Specialist (EdS), 2005
Marshall University
Major: Curriculum and Instruction
Minor: Instructional Technology

Master of Arts (MA), 1977
Marshall University
Major: Reading Education

Bachelor of Arts (BA), 1972
Marshall University
Major: Secondary Education (Mathematics 7-12 and English 7-12)

Professional Experiences

Coordinator for School Improvement, (2006 – Present)
West Virginia Center for Professional Development
Charleston, West Virginia

Assistant Professor Graduate School of Education and Professional Development, (2005 - 2006)
Marshall University Graduate College
South Charleston, West Virginia

Coordinator of Technical Assistance for School Improvement & Coordinator of Integrating Strategies and Technology in Education Practice (InSTEP), (2002 – 2005)
Regional Educational Service Agency II
Huntington, West Virginia

Regional Master Mentor Teacher, Project MERIT (2001 - 2002)
West Virginia Department of Education
Charleston, West Virginia

Teacher of Secondary Mathematics (1994 - 2001)
Cabell Midland High School
Ona, West Virginia

Teacher of Secondary Mathematics (1986 -1994)
Barboursville High School
Barboursville, West Virginia

Teacher of Secondary Mathematics (1976 - 1981)
Huntington East High School
Huntington, West Virginia

Teacher of Mathematics (1975 -1976)
Beverly Hills Junior High School
Huntington, West Virginia

Teacher of Mathematics (1973 -1974)
Longfellow Junior High School
Enid, Oklahoma

Certification/License

Professional Teaching Certifications
Mathematics 7 - 12
English 7 - 12

Publications

Billheimer, D. (2007). Documenting professional growth and competency in multimedia usage. In C. Crawford et al. (Eds.), Proceedings of Society for Information Technology and Teacher Education International Conference 2007 (pp. 31-33). Chesapeake, VA: AACE.

Billheimer, D., Heaton, L., Murphy, M., & Sigman, K. (2005). Multimedia in education: integration on multiple levels. In Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2005 (pp. 3008-3011). Norfolk, VA: AACE.

Billheimer, D. (2005). Best practices: journey to excellence 2004-2005.

Publication for Regional Education Service Agency II, Huntington, WV, pp. 1-42.

Presentations

Heaton, L., Orr, S., Young, D., Clark, D., Lewis, R., Singleton, R., Billheimer, D. & Sigman, K. (2007). "Technology Use and Professional Growth through the Residency Portfolio." Society for Information Technology and Teacher Education International Conference (SITE) 2007, San Antonio, Texas.

Billheimer, D. (July 24, 2006). "Concept Mapping Using Inspiration Software." Roane County Summer Academy, Spencer, WV.

Billheimer, D. (June 20, 2006). "Hats Off to Teachers!" Keynote Speaker for West Virginia Center for Professional Development Governor's Academy for Teaching Excellence, Martinsburg, WV.

Billheimer, D. (June 13, 2006). "Hats Off to Teachers!" Keynote Speaker for West Virginia Center for Professional Development Governor's Academy for Teaching Excellence, Flatwoods, WV.

Billheimer, D. (January 24, 2006). "Hats Off to Teachers!" Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Charleston, WV.

Billheimer, D. (October 26, 2005). "Hats Off to Teachers!" Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Martinsburg, WV.

Billheimer, D. (October 26, 2005). "Hats Off to Teachers!" Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Jefferson County, WV.

Billheimer, D. (October 25, 2005). "Hats Off to Teachers!" Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Hampshire County, WV.

Billheimer, D. (October 18, 2005). "Hats Off to Teachers!" Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Morgantown, WV.

Billheimer, D. (October 5, 2005). "Hats Off to Teachers!" Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Charleston, WV.

Billheimer, D. (October 4, 2005). “Hats Off to Teachers!” Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Charleston, WV.

Billheimer, D. & Sigman, K. (June 2005). “Multimedia in Education: Integration on Multiple Levels.” World Conference on Educational Multimedia, Hypermedia and Telecommunications (EDMEDIA) 2005, Montreal, Canada.

Billheimer, D. (June 2005). "High Yield Instructional Strategies: From Research to Practice." Roane County Summer Academy, Spencer, WV.

Billheimer, D. (June 2005). "High Yield Instructional Strategies: From Research to Practice." Lincoln County Teacher Summer Academy, Huntington, WV.

Billheimer, D. (June 2005). "High Yield Instructional Strategies: From Research to Practice." Webster County Summer Academy, Webster Springs, WV.

Billheimer, D. (April 2005). “Parent Involvement.” Logan County Elementary School, Logan, WV.

Billheimer, D., Cummings, F., Grizzell, W., Huffman, J., Linville, W., & Martin, D., (April 2005). “Using eWalk for Classroom Walkthroughs in Lincoln County.” West Virginia Achieves Conference, Charleston, WV.

Billheimer, D. (March 2005). “Using Palm Handheld Computers in the Classroom.” Man Central Elementary, Man, WV.

Billheimer, D. (February 2005). "High Yield Instructional Strategies: From Research to Practice." White Sulphur Springs Elementary, White Sulphur Springs, WV.

Billheimer, D. (January 2005). "High Yield Instructional Strategies: From Research to Practice." West Virginia Achieves Conference, Charleston, WV.

Billheimer, D. (November 2004). “Using Palm Handheld Computers in the Classroom.” Logan Elementary School, Logan, WV.

Billheimer, D. (November 2004). “Opening the Gift Inside.” National Dropout Prevention Network Conference, Orlando, FL.

Billheimer, D. (September 2004). “Using Palm Handheld Computers.” Lincoln County Administrators, Hamlin, WV.

Billheimer, D. (September 2004). “Research Based Instructional Strategies.”

Mingo County Administrator Leadership Academy, Williamson, WV.

Billheimer, D., Clark, D., & Cockrille, D. (July 2004). "Developing Learning Communities." 10th International Congress on Mathematics Education, Copenhagen, Denmark.

Ashworth, S., Billheimer, D., Blaney, L., Clark, D., Contic, D., Destefano, D., Henry, J., Rogers, S., Swiger, M., & Wilson, R. (Summer 2004). "Integrating Strategies for Technology in Education Practice." Center for Educational Technologies Summer Training Sessions, Wheeling, Hinton, Huntington, Princeton, WV.

Billheimer, D. (March 2004). "Research Based Instructional Strategies." West Virginia Center for Professional Development Principals' Leadership Academy, Charleston, WV.

Billheimer, D. & Cockrille, D. (February 2004). "Opening the Gift Inside." National At-Risk Forum, Myrtle Beach, SC.

Billheimer, D. & Cockrille, D. (January 2004). "Bloom's Taxonomy." Hugh Dingess Elementary, Logan, WV.

Billheimer, D. (December 2003). "Building Dynamic Teams." Logan Middle School, Logan, WV.

Billheimer, D. & Cockrille, D. (December 2003). "Bloom's Taxonomy." Verdunville Elementary & Buffalo Elementary, Logan, WV.

Ashworth, S., Billheimer, D., Blaney, L., Clark, D., Contic, D., Chicchirichi, T., Henry, J., Rogers, S., Swiger, M., & Wilson, R. (Summer 2003). "Integrating Strategies for Technology in Education Practice." Center for Educational Technologies Summer Training Sessions, Wheeling, Hinton, Charleston, Princeton, WV.

Billheimer, D. (January 2003). "Hats Off to Teachers!" Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Charleston, WV.

Billheimer, D. (January 2003). "Behavior Styles." West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Charleston, WV.

Billheimer, D., Clark, D., & Swiger, M. (December 2002). "Technology Integration." Mingo County Administrators, Williamson, WV.

Ashworth, S., Billheimer, D. Clark, D., Contic, D., Chicchirichi, T., Rogers, S., &

Swiger, M., & Wilson, R. (November 2002). “Using Palm Handheld Computers.” Appalachian Regional Systemic Initiative, Marshall University, Huntington, WV.

Billheimer, D. & Clark, C. (November 2002). “What’s Cooking?” National Board for Certified Teachers National Conference, San Diego, CA.

Billheimer, D. (October 2002). “Hats Off to Teachers!” Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Romney, Hampshire County, WV.

Billheimer, D. (October 2002). “Behavior Styles.” West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Romney, WV.

Billheimer, D. (October 2002). “Hats Off to Teachers!” Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Charleston, WV.

Billheimer, D. (October 2002). “Behavior Styles.” West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Charleston, WV.

Billheimer, D. (October 2002). “Hats Off to Teachers!” Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Martinsburg, WV.

Billheimer, D. (October 2002). “Behavior Styles.” West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Martinsburg, WV.

Billheimer, D. (October 2002). “Hats Off to Teachers!” Keynote Speaker for West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Morgantown, WV.

Billheimer, D. (October 2002). “Behavior Styles.” West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium, Morgantown, WV.

Ashworth, S., Billheimer, D. Blaney, L., Clark, D., Contic, D., Chicchirichi, T., Destefano, D., Henry, J., Rogers, S., Swiger, M., & Wilson, R. (Summer 2002). “Integrating Strategies for Technology in Education Practice.” Center for Educational Technologies Summer Training Sessions, Wheeling, Hinton, Beckley, Martinsburg, WV.

Billheimer, D. (January 2002). “Character Education.” West Virginia Center for

Professional Development Mentor and Beginning Teacher Symposium, Charleston, WV.

Billheimer, D. (Fall 2001). “Character Education.” West Virginia Center for Professional Development Mentor and Beginning Teacher Symposiums, Morgantown, Charleston, Martinsburg, & Hampshire County, WV.

Billheimer, D. (Summer 2001). “Strategies for Teaching Mathematics.” West Virginia Governor’s Summer Institutes, Huntington, Bridgeport, Parkersburg, & Princeton, WV.

Billheimer, D. (Summer 2001). “Character Education.” West Virginia Governor’s Summer Institutes, Huntington, Bridgeport, Parkersburg, & Princeton, WV.

Billheimer, D. (Summer 2001). “Best Practices in Mathematics.” Effective Schools Conference, Huntington, WV.

Billheimer, D. (Summer 2000). “Mathematics 9-12: Creative Ideas for Hands-on Mathematics.” West Virginia Governor’s Summer Institutes, Huntington, Clarksburg, Flatwoods, WV.

Billheimer, D. (Summer 2000). “Strategies for Teaching Mathematics.” Effective Schools Conference, Huntington, WV.

Billheimer, D. (Summer 1999). “A Conic Surprise”, “The Great Marble Shoot”, “Creative Structured Reviews”, & “Tips for Keeping Students Motivated.” West Virginia Governor’s Summer Institutes, Huntington, Charleston, & Fairmont, WV.

Billheimer, D. & Hogg, J. (Fall 1997). “You Can’t Teach Them if You Can’t Reach Them.” West Virginia Mentor and Beginning Teacher Symposium, Charleston, WV.

Billheimer, D. (Summer 1997). “Instructional Goals and Objectives for Mathematics 9-12.” West Virginia Governor’s Summer Institutes, Charleston, Parkersburg, Princeton, Clarksburg, & Huntington, WV.

Educational Service Activities

Service Learning Clown Troupe, Cabell Midland High School Eagles' Nest, 1995-1998

Honors and Awards

Arch Coal Teacher Achievement Award, 2001

Radio Shack National Teacher Awards, Honorable Mention, 2001

Teacher of the Month, Cabell Midland High School, June 2001

Professional Activities

Certified Palm Education Training Coordinator, (PETC), 2003-Present

Lincoln County Strategic Planning Committee Member, 2004-2005

Lincoln County School Support Team Member, 2003-2005

High Yield Instructional Strategies for Regional Education Service Agency II Substitute Training, 2003-2005

Facilitator Spring Hill Elementary Book Study Group, Regional Education Service Agency II, 2004

Chairperson for Regional Education Service Agency II Math, Science, & Technology Consortium, 2004

Co-Facilitator Book Study Groups, Beale Elementary, Logan Middle School, East Lynn Elementary, Mason Elementary, Ferrelsburg Elementary, Lenore K-8, Huntington High School, Regional Education Service Agency II, WV, 2003-2004

West Virginia Mathematics Leadership Team, Project MERIT, 1998-2003

Executive Board for North Central Association Commission on Schools and Board of Trustees for North Central Association Commission on Accreditation and School Improvement, West Virginia Representative, 1999-2002

West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium Facilitator, 2001-2002

North Central Association Commission on Accreditation and School Improvement, Teacher Representative for West Virginia State Committee, 1997-2002

Advisory Board for Project MERIT/CATS, West Virginia Department of Education, 2002

West Virginia Governor's Summer Institutes, Facilitator, 1997-2001

Advisory Board, June Harless Center for Rural Education, Marshall University, 2000

West Virginia Center for Professional Development Mentor and Beginning Teacher Symposium Facilitator, 1997-1998