TECHNOLOGY LEADERSHIP:

HOW PRINCIPALS, TECHNOLOGY COORDINATORS, AND TECHNOLOGY INTERACT IN K-12 SCHOOLS

A Dissertation Presented to

The Faculty of the Curry School of Education

University of Virginia

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

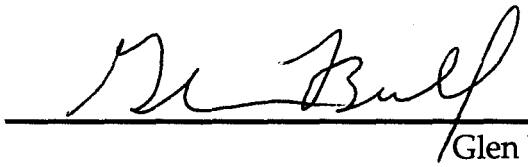
Elizabeth Langran

May 2006

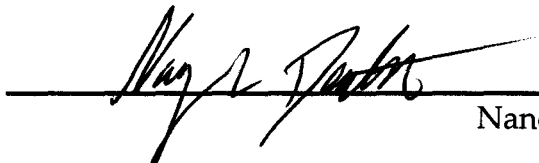
Leadership, Policy and Foundations
Curry School of Education
University of Virginia
Charlottesville, Virginia

APPROVAL OF THE DISSERTATION

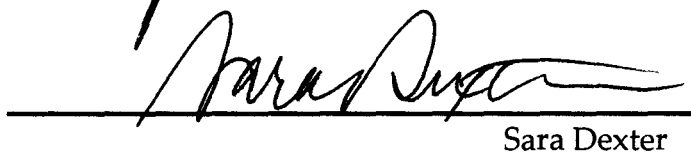
This dissertation, *Technology Leadership: How Principals, Technology Coordinators, and Technology Interact in K-12 Schools*, has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of Doctor or Philosophy.



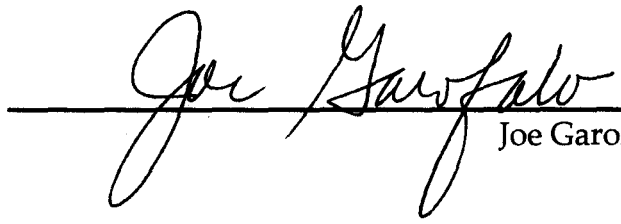
Glen Bull, Advisor



Nancy Deutsch



Sara Dexter



Joe Garofalo

Date 11/27/06

ABSTRACT

One school division attempted to build technology leadership among principals and technology coordinators in seven schools; this population served as the subjects of this study. The school division's attempt to build technology leadership did not achieve its original project goals, but the participants reported some positive experiences.

Results of this study indicated that technology coordinators in this school division have roles that vary greatly across schools. They have an ambiguous role that is problematic when coworkers do not understand the technology coordinator position. Technology coordinators are neither administrators nor classroom teachers, but draw upon experience as former classroom teachers as well as upon a broad skillset for the multiple dimensions of their position. With their access to teachers, principals, and school division administrators, technology coordinators have the potential to act as global change agents and leaders in the schools and help interpret a school division's vision to fit in with the local culture of their school.

The principal's role in technology decisions is essential in creating schools that effectively integrate technology. By evaluating teachers' use of technology in the classroom and modeling, these principals created an expectation for

technology integration in the classroom. Technology decisions in the schools participating in this study were generally initiated from the top, and were often inspired by principals sharing ideas with other principals.

Principals and CTIPs participating in this study had varied opinions regarding technology planning. CTIPs and principals who meet frequently are more likely to have similar perceptions of technology planning and policies in place at their school than those who meet infrequently.

By building leadership in others, principals and technology coordinators contributed to a distributed leadership model to sustain change despite shifting personnel. Trust emerged as important in increasing risk-taking and the likelihood of innovation implementation while reducing the sense of overload.

Technology leadership was defined by the study's participants as encompassing the following characteristics: technology leaders 1) relate and communicate; 2) support and enable teachers to use technology; 3) build leadership in others; and 4) have a clear vision regarding ways in which technology can support learning.

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank the two people who have been most influential in my education here at the University of Virginia. Glen Bull and Becky Fisher have both been very generous with their time and have provided wonderful role models for me as I look to continuing my work with schools in the future. My experience here would not have been the same without you.

Among the many things my professors Glen Bull, Mable Kinzie, and John Bunch provided for me was an opportunity to work with other scholars. I thank my cohort, those who came before me, Sara Kajder and Adam Friedman, and those who will follow, especially Tom Hammond and Bill Ferster.

My gratitude also goes to my committee members Nancy Deutsch, Sara Dexter, and Joe Garofalo for the guidance and insights you have each contributed to this product. Your time and expertise are so greatly appreciated. Additional thanks to Charlotte Barber and John Teahan for words of support along the way, and to my study's participants for making time for me despite so many other demands on them.

I am grateful to Hugh Crumley for being with me every step of this journey. Thank you Bruce Miller and to all my Charlottesville friends who have been supportive during my time here: Anastasia Maddox, Kathy Neesen, Michael Matera, Grace Funk, Kim Breining, Sara Johnston, and Tina Schuster, as well as my friends who have sent encouragement from afar.

Finally, I wish to thank my family for all of their constant support throughout this and all of my adventures. I would not have felt so brave without the strong anchor you have provided for me.

TABLE OF CONTENTS

LIST OF TABLES, CHARTS, AND FIGURES

CHAPTER ONE

INTRODUCTION TO THE STUDY

Introduction

U.S. students today have been referred to as Generation Y or the Net Generation. They are the first to grow up surrounded by digital media (Tapscot, 2006). Youths who are immersed in technology and are accustomed to using it on demand to meet their needs expect that connectivity to extend to their needs as learners. Educators are attempting to determine how to make use of the new tools and information-distribution techniques to reach and excite young minds (McHugh, 2005; Morrison & Bowen, 2006). Many schools are far behind today's learners when faced with creating learning experiences that are meaningful and challenging. School districts that introduce technology into their schools may find that it is the teachers, not the students, who are not ready to use the technology. Schools that are attempting to integrate technology into their classrooms rely on the technology coordinator to help teachers overcome their

lack of knowledge and skill with technology. Whether a technology coordinator is a curriculum leader or "electronic janitor" (Reilly, 1999) relegated to fixing jammed printers and network connections will depend largely upon how the principal views the role of the technology coordinator in the school. A principal's relationship with the technology coordinator is an essential component of technology leadership, as is the principal's and technology coordinator's shared vision for technology in the school.

Teaching 21st Century Learners

According to a recent study sponsored by the Pew Internet and American Life Project (Lenhart, Madden, & Hitlin, 2005), 87% of American youths aged 12 to 17 now use the internet, up from 73% in 2000. Of these, 51% use it on a daily basis. One out of two teens has a broadband internet connection at home which is typically used for instant messaging, playing games, making purchases, doing homework, and getting news and health information. 84% of teens report owning at least a computer, cell phone, or PDA, with 44% owning two or more of these devices. They are not only consuming digital media, but are also creating it – more than half of all teens are creating content for the internet, such as blogs, personal webpages, and shared original and remixed artwork, photos, stories, and videos. U.S. teens are certainly living in a wired world. However, students

report that there is a "substantial disconnect" between how they are directed by teachers to use the internet in the classroom, and how students make use of it at home for school assignments (Levin, Arafeh, Lenhart, & Rainie, 2002). Children are learning with the internet, but mostly outside of the classroom, as a reference library, as a study aid, as a virtual guidance counselor, and as a means to communicate with a study group. All of this is usually without the direction of a teacher. A 2002 Pew Foundation study perceived this disconnect to be the result of administrators setting the tone for computer use in the school. A recent CDW Corporation survey of teachers indicated that while more than 70 percent of respondents believe that computers are an important driver of student learning, 27 percent have reported little or no training with integrating computers into their lessons (McHugh, 2005).

Educators and policymakers are advocating technology in schools to engage students and to prepare them for jobs. At the National Education Summit on High Schools in February 2005, Bill Gates suggested that our high schools are obsolete because they do not teach students, especially low-income minority youths, what they need to know to be prepared for today's workforce (Gates, 2005). Formal schooling has become a gatekeeper to access to well-paying jobs, and the new "basic skills" (including technology literacy) required for economic opportunity are higher now than before (Bryk & Schneider, 2002). Since the time

A Nation at Risk (1989) was published, critics over the last two decades have described our nation's schools as being in "peril" and in dire need of reform (DuFour & Eaker, 1998).

Initiatives on structural changes and improving instruction now abound in schools, ranging from alternative scheduling formats to increased accountability requirements (Leithwood & Riehl, 2003). Digital technology is among the new innovations teachers are expected to integrate into their teaching and communication practices. Enthusiasts promote the use of computers in the K-12 classroom to transform teaching and learning into a more productive and engaging experience. Others caution that the promises of computers in education have been "oversold" at a cost of 70 billion dollars just in the 1990's, with little return on investment (Cuban, 1986; Oppenheimer, 2003). A few published studies (Becker, 1994; Kozma, 1991; Christmann & Badgett, 1999) indicated that computer use can have a positive affect on student outcomes, but there is also evidence that access to computers and the academic benefits from computer use are not the same for all students (Hedges, Konstantopoulos, & Thorenson, 2003). Much more research is needed in the field of technology and learning before we can conclusively determine its effect on student achievement (Bull, Knezek, Roblyer, Schrum, & Thomson, 2005).

Technology Integration Requires Technology Leadership

The question, however, is not *if* technology will impact our schools, but *how* we can best use it in schools. Legislation such as the Improving America's Schools Act of 1994, the Telecommunications Act of 1996, and E-rate funding, demonstrated the financial, political, and community interest in promoting technology in U.S. schools in the previous decade.

> While this spending shows a dramatic increase in technology investment, there's often been a lack of essential planning regarding what purposes the technology would serve and how it would be used to accomplish those purposes. The expectation has commonly been that simply placing technology tools in the classroom leads to exciting results and improved student learning (Frasier & Bailey, 2004, p. 125).

Teachers have increasing access to computers, and nearly all classrooms are now linked to the internet, but considerable evidence indicates that currently few teachers successfully integrate technology into their teaching practice (Hedges et al., 2003; Bull & Garofalo, 2004). Many schools are now supporting technology purchases with a sizeable portion of their budget, but technology integration and implementation rely on more than just hardware or a single intervention. Despite improved access to technology, software, and teacher training, teachers still struggle to effectively use technology.

Because of the constraints placed on teachers by school structures and cultures, teachers will only be willing to try out an innovation if it meets their

needs and is simple, reliable, and worth the energy invested (Cuban 1986). These barriers will not be overcome by simply offering teacher workshops or more hardware. Additionally, technology leaders can reduce these barriers by incorporating time into teachers' schedules to learn to use technology, by funding the resources to support technology integration from hardware to professional development, by modeling technology use, and by providing access to supported technology (Dexter et al., 2002).

Previous research in this area indicates that while technology infrastructure is important, technology leadership is even more necessary for effective utilization of technology in schooling (Anderson & Dexter, 2005). School administrators and technology staff need to make informed decisions to support the effective integration of technology. "To use technology properly, leaders must understand technology's application in data-driven decision making, how technology intersects with pedagogy, what technology can and cannot do, and how to assess the latest tools and their uses" (Paben, 2002, p. 24). Studies of school improvement in general point to the importance of principals' leadership (Berman, McLaughlin, Pincus, Weiler, & Williams, 1979; Fullan, 2001a; Louis, 1994). A principal's actions, such as attending training sessions, are a way of measuring the principal's support of an innovation, and are good indicators of the innovation's future success (Berman et al., 1979).

The technology coordinator also has a key role in providing leadership for technology integration. Helping teachers to integrate technology is generally the job of the technology coordinator:

> To change the way they teach and the materials they use requires time, commitment, risk taking, adequate resources, and consistent and patient support. The technology coordinator needs to be able to inspire teachers with a vision of how effective technology integration can benefit them and demonstrate activities, lesson plans, and processes that make exciting use of technology resources (Frasier & Bailey, 2004, p. 40).

While many schools have created technology coordinator positions, the technology coordinators are often seen as peers of teachers and are unable to reach those who do not seek help in integrating technology. If technology coordinators are unable to act as leaders in the school, they will need to rely on the school principal to address the issue of reluctant teachers. In schools where technology coordinators have control over their own schedules and are not necessarily tied to a lab, the technology coordinators can move in and out of classrooms more freely, keeping a global pulse on the school and exercising a wide sphere of influence to help teachers integrate technology within their own classrooms (Scot, 2005). Most of the literature on school leadership focuses on the role of the principal and others in formal positions of authority. However, teachers and technology coordinators can also be leaders, whether recognized on the basis of their formal positions of authority, or a particular expertise they

possess (Leithwood & Riehl, 2003). Experts in the field of leadership, such as Michael Fullan (2001a), contend that leaders are not born, but rather are nurtured. The job of a principal becomes to enhance the skills and knowledge of the people they work with, and to develop new leadership by sharing and developing knowledge.

Rosemont County's CTIPs and the V-LIT II Initiative

Rosemont* County Schools, a school division in central Virginia, currently has a team of building-based instructional technology specialists, called Curriculum Technology Integration Partners, or CTIPs. Each is attached to no more than two schools (in most cases, just one) and fulfills a variety of roles in the building. While technology is used in schools administratively for information management and data processing (Frasier & Bailey, 2004), the emphasis of the role of a CTIP is on technology's role in learning. CTIPs act primarily as mentor teachers, partnering with classroom teachers on curriculum projects that often involve the use of technology. They model technology-rich lessons, coach teachers on creating projects and infusing units with technology, and assist the teachers in gaining technology competence for increased teacher

* Rosemont County is a pseudonym.

productivity and student learning. Many of these CTIPs are former classroom teachers who emerged as teacher leaders at their schools.

Since the creation of the CTIP role, Rosemont County administrators have discovered the potential for this person to be a leader in the school capable of acting as a powerful change agent, facilitating global change toward improved educational practice using technology. The CTIP model has been very successful in Rosemont, beginning four years ago as a small pilot project. Even though principals must contribute some of their general staffing allocation to fund this position, it has expanded to include a CTIP teacher in all of the schools for the 2004-2005 school year. The County identified two needs for the program to continue to realize its full potential:

- First, the school division needed to continue to expand the expertise and knowledge base of the CTIP teachers. These teachers, many of whom started out as classroom teachers at their schools, are motivated learners who are driven to continue professional growth.
- Second, the school division needed to develop stronger relationships between the school administrator and the CTIP in many of the schools.

While this relationship was judged to be strong at the time, Rosemont County administrators believed it would benefit from structured time for shared

experiences and development of a deeper understanding of the role that technology can play in a school to foster improved student and teacher performance. Technology can serve as a catalyst for pedagogical and curricular change. Rosemont County administrators believe that when the school administrator and CTIP teacher have a shared vision, their synergy becomes a powerful force for positive school change.

In 2004, Rosemont County made plans to partner with the Virginia Leadership in Technology (V-LIT) project to offer a technology leadership initiative, titled by the school division as "V-LIT II," to provide the structure to develop a shared vision of technology integration at each school. V-LIT II was intended to provide multiple opportunities for meaningful conversation and shared experiences between school administrators and their CTIPs. CTIPs would focus on leadership skills to work with the teachers in their building and to carry out the vision for technology integration, while administration staff development would focus on the National Educational Technology Standards for Administrators (NETS-A) (ISTE, 2002). In January, 2005, seven schools out of the County's 25 signed up to participate in this initiative that was to include attendance at the National Educational Computing Conference in July, 2005, an assessment of the school's current technology status using the online Taking a Good Look at Technology (TAGLIT) survey instrument, dinner meetings with

the V-LIT project director, and presentations at regional conferences in the fall. This V-LIT II initiative was designed to create a space and opportunity to activate awareness about technology leadership and technology integration, and the TAGLIT survey was to provide a data point for discussion as a team. It was hoped that the technology leadership training, if found to be successful, would serve as a model for other school districts interested in more effective uses of technology.

Definition of Key Terms

Technology Leadership

There is little literature to support a definition of technology leadership. For Anderson and Dexter (2005), it represents "the organizational decisions, policies, or actions that facilitate effective utilization of information technology throughout the school". Bailey and Lumley (1995) view a technology leader as someone who values technology as the primary tool that will change teaching and learning. A leader must be able to model the technology, understand how technology can be used as an instructional tool across all disciplines, and have a focus on systems thinking while assisting others through the transformation. Much of the literature on technology leadership focuses on people already in

formal leadership roles, specifically administrative positions, and how they can make better decisions about technology.

While technology leadership is a relatively new term, we do have a good deal of literature on educational leadership, but, like with many complex concepts, there is a lack of consensus. While most theorists generally agree that leadership means to set directions and exercise influence, there still are many different definitions (Leithwood, 2005). Some models focus on the leader's own thoughts and actions ("leader-centric"), while others focus more on the assent and participation of the followers ("follower-centric") (Leithwood & Riehl, 2003). In leader-centric models, it is the leaders who set directions, motivating people to "tackle tough problems" (Heifetz, 1994, p. 15), while the follower-centric see the followers being motivated by the leader, but participating in setting directions as well. Distributed leadership is a phenomenon emerging from a group or network of interacting people, rather than from one individual (Bennett, Wise, Woods, & Harvey, 2003). This definition opens the boundaries of leadership, allowing individuals, such as technology coordinators, to be seen as leaders. Leadership then becomes more of an organizational quality, focusing on interactions between people and their situation, rather than an individual attribute (Spillane, 2005). While some theories of leadership focus on the official function of being in a position of authority, leadership that is contingent on setting, the nature of the

social organization, the goals, resources, and people involved is more common in current literature. Leithwood and Riehl (2003) define school leaders as "those persons, occupying various roles in the school, who work with others to provide direction and who exert influence on persons and things in order to achieve the school's goals" (2003, p. 9).

"Instructional leadership" focuses on improving classroom practices. "Transformational leadership" focuses on wider conditions that are needed to improve learning. "Democratic" and "participative leadership" are concerned with how decisions are made about school priorities. Additionally, evidence suggests that successful leaders behave differently depending on the circumstances under which they are working, and the people involved (Leithwood, Louis, Anderson, & Wahlstrom, 2004).

Michael Fullan (2001a) has found in extensive work with school improvement that an essential condition for success is leaders capable of "assessment literacy," able to examine student performance data and make sense of it, to develop actions plans based on the data, and to "contribute to the political debate about the uses and misuses of achievement data in an era of high-stakes accountability" (Fullan, 2001a, p. 117).

The field of technology leadership would be well served by increased precision of the conceptual dimensions of the term (Anderson & Dexter, 2005).

One of the goals of this study was to define technology leadership as viewed by the participants of Rosemont County. The new definition, discussed in Chapter 5, includes not just school administrators, but also those who already work in the domain of technology (technology coordinators) and are further developing their leadership skills.

CTIP

Technology coordinators have many different titles across school districts in the United States. In Rosemont County, they are called Curriculum Technology Integration Partners, or CTIPs. This title was chosen to reflect the emphasis Rosemont wanted to place on curriculum, rather than on technology. Rosemont began providing building-based support for teachers using technology in 1994, with the creation of Instructional Technology Specialists (ITS), who traveled around the division helping teachers learn to use technology. Three ITS were not sufficient for the division's needs. Some principals and teachers voiced their desire to have greater technology support available to them in their classrooms when they needed it. In 2001, the CTIP position was created. The division's central office contributed partially to the funding for the staffing, but left hiring and remaining funding decisions up to the schools (Scot, 2005).

Currently there are CTIPs in all division schools, with some CTIPs assigned to two schools.

Technology Integration

A number of definitions have been offered for technology integration in schools. Some are more focused on the students' and teachers' ability to use hardware:

> Technology integration is the use of technology resources -- computers, digital cameras, CD-ROMs, software applications, the Internet, etc. -- in daily classroom practices, and in the management of a school. Technology integration is achieved when the use of technology is routine and transparent. Technology integration is achieved when a child or a teacher doesn't stop to think that he or she is using a computer or researching via the Internet (George Lucas Educational Foundation, 2004).

Vojtek and Vojtek (1999) state that technology integration occurs when "students are learning the knowledge and skills of the core curriculum and are simply using technology as a tool to help them complete their learning tasks in the most efficient manner." Other definitions focus on the teacher's ability to teach content better by using technology (Dexter, 2002). Perhaps most useful for the purposes of this study is the concept that technology integration is a process, as described by the National Center for Educational Statistics:

> The goal of perfect technology integration is inherently unreachable: technologies change and develop, students and teachers come and go – things change. It is the process by which people and their institutional setting adapt to the technology that matters most. The process of

> technology integration is one of continuous change, learning, and (hopefully) improvement (National Center for Educational Statistics, 2003, p. 75).

Recognizing technology integration as a process, rather than a product, has a better chance of producing more sustainable changes. This approach will view change as a process that takes into account the whole of the organization: the people, their relationships, the hierarchy, its subsystems, its culture. It must be recognized that school change has direct impact on people, and that professional development practices have implications for people experiencing change.

V-LIT

Beginning in 2000, The Bill and Melinda Gates Foundation awarded all 50 states with State Challenge Grants for Leadership Development in order to provide superintendents and principals with leadership development opportunities focused on technology. The grants are part of a $350 million, three-year commitment to work toward supporting technology integration. These programs vary from state to state, but generally include summer academies, on-line learning, coaching and mentoring, assessment tools, conferences, and workshops.

In 2001, a Bill and Melinda Gates Foundation grant was awarded to the University of Virginia, in concert with Virginia Tech, the Virginia State Department of Education, and the Virginia Educational Technology Alliance. The project resulting from this grant was titled the Virginia Leadership in Technology, or V-LIT, and was designed to work with principals and superintendents in Virginia to develop knowledge and skills so that technology is better utilized in their schools. V-LIT II refers to the joint initiative of V-LIT and Rosemont County Public Schools to build technology leadership and the relationships between CTIPs and their principals in Rosemont County.

Research Questions

Technology-based innovations may provide an opportunity to observe how a school division responds to the need for leadership in the face of implementing school change, as administrators and teachers make decisions about the availability, use, and impact of computers in school. This is also an occasion to learn about how the division supports leadership activities in situations that require strong leadership, and add to what we know about leadership in general. Given the goals of V-LIT II and the lack of a definition of

technology leadership, the following research questions became the focus of this study:

- How is technology leadership defined by the teachers, CTIPs, and administrators of Rosemont County?
- What are the defined and operational roles of the CTIPs and principals at each school with regards to technology leadership? How can the relationship between the principals and the CTIPs be characterized?
- What processes and outcomes do these principals and CTIPs expect from the V-LIT II technology leadership project, and to what extent do they feel V-LIT II is meeting their needs?

Significance of the Study

Results of this study have contributed to a greater understanding of technology leadership of the schools participating in V-LIT II by examining the principals' and CTIPs' roles and relationships. This study is also significant because its results have identified some of the best practices that promote technology leadership. Technology integration is complex, and without effective leadership, will not be sustained. Only pockets of excellence, rather than whole-system change, will be achieved, despite large investments in technology, unless

technology leadership is developed in both administrators and in those directly giving technology support to teachers at the building level. Technology leadership is a relatively new field and still under exploration; little has been written about developing leadership in technology coordinators or in their relationship with the principal. The findings of this study address this gap in the literature.

Overview of the Methodology

Quantitative and qualitative data were collected to examine technology leadership in these schools. The quantitative data came from an online survey of the teachers in each of the schools participating in V-LIT II. Additionally, each principal and CTIP participating in V-LIT II was invited to take the TAGLIT survey to collect information about technology planning, budget, policies, resources, technical and instructional support, teacher and student skills, classroom use, community involvement, and professional development at each school. These surveys are further examined in Chapters Three and Four, and are included in the appendices.

The qualitative portion sought to gain a fuller understanding of the views and experiences of the participants through a series of interviews with principals,

CTIPs, and County administrators, and observations of a V-LIT II meeting. Using the qualitative research model of Huberman and Miles (1994), the semi-structured interview questions were chosen at the beginning of the research, based on the literature in this area. Analysis sought to discover the relationships and structure among the phenomena studied. The process focused on data reduction, data display, drawing conclusions and verification. Data analysis and data collection during this study were concurrent, and multiple data sources were used in order to establish convergent validity before offering assertions.

Summary

The need for research in the area of technology leadership, particularly in developing the leadership of technology coordinators, and in investigating the relationship between the principal and technology coordinator at a school was identified in this chapter. This study is of importance because its results offer more information about a definition of technology leadership, as well as what promotes or hinders technology leadership, a critical component necessary for technology integration. Identifying these conditions and processes that surround successful technology leadership, and thus technology integration, contributes to

what we know about change in schools and about teaching and learning with technology.

Chapter Two of this proposal offers a review of the literature on leadership in a culture of change, and some of the theories built around how to achieve systematic change. Chapter Three provides explanations of the research paradigm and methodology for this study. Chapter Four presents the findings of the study, and Chapter Five offers a discussion of the findings and implications for the field.

CHAPTER TWO

A REVIEW OF THE LITERATURE

Introduction

Kenneth Leithwood (2005) completed a review of the research on educational leadership, and concluded that most empirical evidence about the effect of leadership on student learning is derived from studies of school principals. These studies indicate that leadership is the second most influential within-school variable on student learning, just behind teacher instruction. In quantitative studies, however, researchers have had difficulty in tracing the entire chain of connections between school leadership and student achievement, and qualitative studies are not necessarily generalizable (Leithwood & Riehl, 2003). There is a renewed interest in educational leadership due to the increased scrutiny on schools and their outcomes, and how leaders can influence those outcomes. The body of research on educational leadership concludes that leadership matters, and that the changing needs of schools can be met at least in part by improvements in leadership (Leithwood & Riehl, 2003).

This literature review draws upon some of the major themes prevalent in educational leadership studies today, particularly in those instances where it is related to technology and school change. These themes include leading in a culture of change, distributed leadership, trust, and planning and communicating a vision. The theme of professional learning communities is also included. The DuFours' work on this subject has been particularly influential among Rosemont County administrators.

Literature Review

The Role of Administrators

The National Educational Technology Standards for Administrators (NETS-A) (ISTE, 2002) is a set of guidelines indicating what principals and other administrators should know about technology and how they should make use of it. According to the NETS-A guidelines, principals need to understand how technology supports teaching and learning in order to make informed decisions and develop a vision for technology in the school. The NETS-A go beyond suggesting that principals merely provide funds for technology hardware and software. Instead, they state that educational leaders should:

- inspire a shared vision for comprehensive integration of technology and foster an environment and culture conducive to the realization of that vision;
- ensure that curricular design, instructional strategies, and learning environments integrate appropriate technologies to maximize learning and teaching;
- apply technology to enhance their professional practice and to increase their own productivity and that of others;
- ensure the integration of technology to support productive systems for learning and administration;
- use technology to plan and implement comprehensive systems of effective assessment and evaluation; and
- understand the social, legal, and ethical issues related to technology and model responsible decision-making related to these issues (ISTE, 2002).

While most of the literature available concerns principals' roles in innovations in general and not necessarily in regard specifically to technology, we do know that the role of the principal is crucial in sustaining change in schools: "Reform can be initiated from outside the school or stimulated from

within. But in the end, it is the principal who implements and sustains the changes through the inevitable roller coaster of euphoria and setbacks"(Gerstner, Semerad, Doyle, & Johnston, 1994, p. 133). There are a few studies that indicate that school leadership is a predictor of technology integration. Anderson and Dexter (2005) used survey information from 1,150 schools, including approximately 4,100 teachers, 800 technology coordinators, and 867 principals. They found that the principal's involvement with technology had a significant, positive correlation with technology outcome indicators of teachers' and students' use of technology in the classroom, and had higher correlation than technology infrastructure did with technology outcomes. This suggests that technology leadership is more influential on technology use in schools than technology infrastructure and expenditures. The few studies on technology leadership (Dooley, 1998; Hughes & Zachariah, 2001) that surveyed the impact of principals' leadership styles on technology use found that the principal's leadership style had an effect on the level of technology integration.

The Role of the Technology Coordinator

Technology integration is unlikely to succeed without the strong support of a technology coordinator. One study examined the results of a national survey of 488 principals, 467 technology coordinators and 2,251 teachers who were

questioned about the goals of technology and teaching, as well as the current implementation of technology within their schools. The results confirmed the positive correlation of teachers' frequency, variety, and novel uses of technology with the availability of quality technology support, defined as access to one-on-one help, frequent teacher participation in technology professional development focused on instruction and integration, and access to resources (Dexter, Anderson, & Ronnkvist, 2002). The U.S. Department of Education National Center for Educational Statistics reported in 2000 that nearly two-thirds of all teachers polled reported that lack of technical support or advice was a barrier to their use of technology (National Center for Educational Statistics, 2000).

The position of technology coordinator was created to provide this critical support. Technology coordinators are required to have a number of diverse skills to carry out their multi-faceted jobs, which include interpersonal, problem-solving, leadership and planning, and technical skills (Frasier & Bailey, 2004).Technology coordinators are expected to be able to establish and articulate a vision for technology, and a technology plan for carrying out that vision. Additionally, they need to work with teachers and students to model effective uses of technology, develop policies, manage budgets, work with school and district administration, manage network operations, support administrative computing, deal with technical issues, and collect and share information about

best practices, among other tasks (Frasier & Bailey, 2004). A job description of a technology coordinator might include performance responsibilities such as:

> Provide visionary leadership and articulate that vision in areas of responsibility, build working relationships with key community leaders and organizations, develop plans to increase the level of technological literacy for students, faculty, and staff, assist the district in developing and implementing an educational technology infrastructure that meets systemwide needs, provide leadership in technology training, resources acquisition, and staff development (Frasier & Bailey, 2004, p. 18).

Researchers at TERC, a not-for-profit education research organization, used data from a technology coordinator's electronic log, interviews, and observations to document the range of roles a technology coordinator plays, including the pivotal role a technology coordinator can have in facilitating global change. This position requires individuals who are primarily interested in content area teaching and learning, are enthused about technology, and are able to adapt to a range of teacher readiness. "Schools are hierarchical institutions with well-structured position descriptions in place, and administrators and teachers may have difficulty, initially, understanding what this position is, why it is needed, and what rights and responsibilities the individual in this position should be accorded" (Wasser, McGillivray, & McNamara, 1998).

At the heart of much of this is the technology coordinator's ability to relate to and communicate with teachers and administrators. Frasier and Bailey (2004)

assert that "the technology coordinator must be able to determine and articulate how technology will be used organization-wide and use this information to make decisions and communicate them to administrators, teachers, and other district staff" (p. 15). The ability to understand a teacher's perspective can help a technology coordinator conceptualize how technology can be integrated in the classroom, and relate to teachers on the level of someone who understands their situation (Frasier & Bailey, 2004).

Many of these responsibilities are ones of leadership; technology coordinators are expected to help establish the vision for technology in the school and then create policies to support the vision, train staff to progress toward the vision, and solve any problems along the way (Frasier & Bailey, 2004). However, technology coordinators generally do not have the title and position of an administrator. The role of the technology coordinator in the school's integration and implementation of technology is undeniably important, but if the technology coordinator is not given a chance to exercise leadership, the ability of the school to support innovation over the long term may be hindered.

Despite the importance of this newly-created position, first appearing in the 1980's, it often does not receive adequate support and coordination (Frasier & Bailey, 2004). Technology coordinators, in order to help teachers properly, need

to have sufficient time and resources, and need support in providing training and collaboration (Strudler, 1995-96; Strudler, Falba, & Hearrington, 2003).

Leading in a Culture of Change, and Working with Innovation Overload

> "The more complex society gets, the more sophisticated leadership must become" (Fullan, 2001a, p. ix).

Leithwood (2005) maintains that the breadth and depth of knowledge that leaders need to make significant contributions to student learning is at an all-time high and with the new focus on achievement standards, principals are under increasing pressure to perform. Educational leaders are held accountable for what structures and procedures they put into practice, as well as the performance of their students and teachers (Leithwood & Riehl, 2003). Leaders today are faced with the difficulty of responding to a radically changing environment without introducing one initiative after another, leaving their followers feeling overloaded. Principals have to navigate an ever-changing set of problems and are given many innovative policies that they are supposed to implement, as they are showered with sometimes unwanted, uncoordinated policies and innovations. It becomes important, therefore, for leaders to understand the process of change, and have respect for the complexities that come with change (Fullan, 2001a). Hannay and Denby (1994) found in their

study that department heads were not effective as facilitators of school improvement when they lacked knowledge about effective change strategies.

> [Teachers and administrators currently are] under a continuing pressure to increase…test scores, decrease behavioral problems and absenteeism, institute new county reading, math and spelling initiatives, use computers, cameras and projectors in instruction, learn new software, and be able to become technology certified before their professional license was up for renewal (Scot, 2005, p.101).

Fullan (2001b) refers to this as "innovation overload," and this may act as a barrier to technology integration. Teachers can become overwhelmed by innovative fads that are disconnected and fragmented, and often respond to the continuous cycle of initiating and then abandoning change initiatives with jaded resignation, knowing that "this too shall pass" (Creighton, 2003; DuFour & Eaker, 1998). There is often an assumption that if something is approved by the state department of education, then it will happen automatically in the classroom (Reeves, 2005). While there are pressures to add to the number of initiatives in a school district, there is no system for abandoning anything. Teachers already have their plates full before having school reform initiatives added on top, and many teachers may ask what the point is in putting in the hard work of reform. Unless teachers trust that the initiative is in the long run truly going to improve the school, it is unlikely they will want to put in the extra time and effort for taking risks, going to extra professional development sessions, and planning and implementing the reform.

It is not enough to tell school personnel to work through school reform and implement changes; they must be provided with adequate time, something often overlooked: "When teachers are expected to implement substantive changes at the same time that they manage everything else in their already overburdened schedules, there is little chance that the initiatives will be sustained" (DuFour & Eaker, 1998, p. 111). If teachers are told to collaborate, for example, but not provided with time to do so, the message that is conveyed by the school administration is that collaboration is really not a priority. Teachers are typically isolated in traditional school cultures, and unless collaboration is incorporated into the structure of the school day and training on collaboration provided, collaboration can quickly fall by the wayside with other failed initiatives.

According to Jonathon Saphier (2005), school leaders can have an effect on their staff members if they "say it, model it, organize for it, protect it, and reward it" (p. 105). A principal's articulation of a school vision, attendance at teacher workshops, working time for collaboration into teachers' schedules, and support for teachers who are using technology are all examples of ways principals can motivate their staff and move the school culture to one more hospitable to change. Principals are in the position to be models of lifelong learning. To lead in a culture of change is to create a culture that works with change. "It does not

mean adopting innovations, one after another; it does mean producing the capacity to seek, critically assess, and selectively incorporate new ideas and practices – all the time, inside the organization as well as outside it" (Fullan, 2001a, p. 44). Unless school and district leaders agree with the purpose and needs of the requirements for successful implementation, the chance of any reform improving student learning is remote (Leithwood et al., 2004). Leaders create a culture that works with change, allowing individuals to learn and share best practices, as is done in a learning community. Fullan describes this logic as: (1) complex, turbulent environments generate messiness and reams of ideas; (2) interacting individuals are the key to accessing and sorting out these ideas; (3) individuals need to be motivated to share, so their contributions must be valued (Fullan, 2001a, p. 87).

Principals don't have to know everything a technology coordinator knows about technology, but they do have to remain visible and involved in guiding the process of technology integration (Creighton, 2003). Currently principals are under significant pressure to raise test scores and performance goals following the passage of the federal No Child Left Behind legislation in 2002. Technology may be seen as either one more added stress that an administrator does not have time to deal with, or it may also be seen as a solution to deal with low test scores. The principal's role in technology integration is critical in many aspects, not the

least of which includes decisions on funding. Some school districts are investing millions of dollars in computers and drilling software intended to boost students' scores on standardized tests (MacGillis, 2004). Administrators need to weigh priorities, as the costly emphasis on test preparation software may come at the expense of other areas of education, such as time spent on other teaching activities or money spent elsewhere. In today's atmosphere where there are great demands for change in schools, principals need to make informed decisions about technology use. The understanding that technology is not a panacea, but is most effective in classrooms where there are highly qualified, well-trained teachers ready to make full use of technology will help principals make better decisions on technology investments.

Rosemont County's principals and teachers have no shortage of initiatives in their schools. All seven of the schools participating in V-LIT II, however, agreed to participate. This raised the question of how and why Rosemont County school leaders were willing to trust the school division and take on yet another initiative.

Distributed Leadership

Another major theme from current literature on educational leadership emerged from the observation that highly successful leaders develop and count

on leadership contributions from other people at their school. This concept of "initiatives or practices used to influence members of the organization… exercised by more than a single person" is referred to as distributed leadership (Leithwood, 2005, p. 17). Distributed leadership, similar to shared, collaborative, democratic, and participative leadership, allows a school to benefit from the capacity of more of its teachers by drawing on their individual strengths, and leading to greater interdependence and more opportunities to learn from one another (Leithwood, 2005). Bennett, Wise, Woods, and Harvey (2003) assert that it relies on the perspectives and capabilities of individuals throughout an organization, that when brought together represent more than the sum of its individual contributors. This represents a more fluid definition of leadership, relying on expertise instead of on a position, which is only possible within a climate of trust and mutual support (Bennett et al., 2003). Bennett asserts that leadership practice is distributed among formal and informal leaders. Spillane's (2005) view of distributed leadership focuses on the interactions between people and their situation; leadership is not a product of leader's knowledge and skill, but rather a result of the social process in which members have an inter-dependency.

Learning communities depend on a leadership that is widely distributed throughout a school, and it is thus imperative to develop the leadership potential

of all staff members. High performance, both in education and in the business world, does not depend on a charismatic, heroic leader, but on a culture that sustains improvement despite the departure of key individuals (DuFour, Eaker, & DuFour, 2005). Sustainable change involves a core leadership group, not just one person. The mission of the core leadership group is to initiate and sustain an ongoing discourse on school improvement, constantly look for new research and ideas, examine the internal environment of the school, monitor change efforts, and note successes (Lezotte, 2005). In Rosemont County, the school division is attempting to build this core leadership group by inviting CTIPs and principals to participate in V-LIT II. By building this core leadership group, they are able to continue to build technology leadership even when principals or CTIPs change schools or leave the division over the summer. Fullan (2005) argues that the key to sustaining change is to increase leaders' participation in wider contexts and help develop leadership in others to do the same: "…the main mark of a school principal at the end of his or her tenure is not just his or her impact on the bottom line of student achievement, but equally on how many good leaders he or she leaves behind who can go even further" (Fullan, 2005, p. 220).

Developing the leadership of teachers has had an impact in teaching quality and student performance, according to several studies. Marks and Louis (1997) found that teachers' participation in school governance had a positive

effect on teaching and student achievement. Wasley (1991) found that teachers who assumed the role of being a leader had increased professional learning. Leithwood and Riehl (2003) found a number of other studies that support the importance of teacher leadership for school improvement in their review of the literature on educational leadership. From the distributed leadership perspective, if all teachers in the school have the potential to act as leaders in relation to particular issues, then it is important that they have opportunities for professional development in leadership (Bennett et al., 2003). This professional development should include: basic ideas in leadership and management, working constructively in teams and including diverse participants, the role of informal leadership as it interacts with formal leadership, and developing a school culture that supports distributive leadership (Bennett et al., 2003). Leadership training should not be solely focused on those in formal positions of authority, but should include all those with the potential of being a leader, and should include training on how these leaders can work together, such as what was attempted in the V-LIT II initiative.

Trust

Trust is an important element in sharing leadership. When a principal trusts the technology coordinator, the technology coordinator is more likely to be

able to exercise leadership in a school. Trust in the school system may also play an important role. The trust in the school district's systemwide approaches may counterbalance the innovation overload so common in schools today. When teachers and administrators have faith in a school division administration enough to know that any initiative is only designed to create better learning and teaching situations, they may be willing to participate in a new initiative, even when their plates are already full.

In the early 1990's, Anthony Bryk, Barbara Schneider, and their research team spent over three years studying schools affected by the Chicago School Reform Act of 1988. Their observations of meetings and events, visits to classrooms, and interviews with principals, teachers, parents, and community leaders pointed to the importance of the quality of social relations existing in the school community. Building on the social capital literature of Robert Putnam, James Coleman, and other economic theorists, Bryk and Schneider theorized that the level of social trust within a school community should influence the effectiveness of Chicago's reform efforts:

> It became clear from a preliminary reading of field notes and interviews that concerns about respect, trust, personal regard, and caring were quite significant to local actors as they sought to make sense of the reform efforts of which they were a part. These emerging observations led us to review selectively the academic literature from a diverse set of fields that bore on these themes (Bryk & Schneider, 2002, p. 35).

The results of Bryk and Schneider's three-year study indicated that schools with higher relational trust levels were associated with improved academic achievement and success in school improvement initiatives. Trust reduces the sense of vulnerability that faculty may experience when asked to take on the uncertainties of school improvement. Additionally, trust facilitates problem-solving, as teachers are more likely to work collaboratively when they trust one-another, and visa-versa. Achieving both mutual support and individual autonomy are features of a professional learning community, where trust is an essential component. This is important as teachers take risks in engaging in new instructional methods that require continuous learning. "In the absence of relational trust, teachers are more likely to withdraw to the privacy of their own classrooms and repeat past practices, even if they clearly do not work" (Bryk & Schneider, 2002, p. 122). Finally, when there is a strong level of trust within the organization, members are more likely to develop personal attachments to the organization, and a belief in its mission, thereby being more willing to engage in the difficult work of school improvement. "Collective decision making with broad teacher buy-in occurs more readily in schools with strong relational trust. This feature is especially significant in times that call for major structural change" (Bryk & Schneider, 2002, p. 136). Reform initiatives will have greater diffusion when the participants are more engaged and trust is strong.

Bryk and Schneider argue that the social relationships in a school, particularly the relationship between principal and faculty, are a fundamental feature of its operations. Principals are unable to closely supervise all aspects of a teacher's work, and so must trust that the teachers are advancing learning and any school improvement initiatives underway. Teachers trust that a principal's actions are in their best interests, and that they will have adequate resources and support to fulfill their duties as a teacher, and working conditions that meet their needs. Principals also signal who and what is respected and valued in the school. During school reform periods, teachers may feel more vulnerable, as the school's inadequacies may fall under scrutiny. The principal's respect and personal regard of the teachers, combined with a strong vision and actions that advance that vision, will establish integrity. The principal's role in creating an atmosphere of trust is key: "While the ends are clear – an environment of high relational trust rooted in professional colleagueship and mutual commitment – attaining this may require significant use of role authority (Bryk & Schneider, 2002, p. 130). Michael Fullan (2001a) has found in his extensive studies on the change process that the single factor common to every successful change initiative is that relationships improve, underlining the importance of relationship-building during the change process.

According to the Center on School Organization and Restructuring at the University of Wisconsin at Madison who conducted a five-year study of school restructuring efforts, trust and respect are crucial to school improvement and to the development of professional community, more so than structural conditions (Newman & Wehlage, 1995). Meaningful social interaction takes place when there is a genuine sense of listening to what each person has to say, not necessarily on the structures and procedures put into place. Teachers need to be able to voice their concerns and feel that the administration will act on them, and the administration needs to feel that the faculty shares its concern in finding ways to improve the functioning of the school. Interpersonal trust becomes greater as people perceive that others care about them, as when a principal creates opportunities for teachers' career development, or shows concern for issues that affect teachers' lives. When there is consistency between what a person says and does, that person has integrity. If a principal can be trusted to keep his or her word, then teachers are more likely to trust the principal. As principals seek change in their schools, they are dependent on the good intentions of the faculty if the initiative is to succeed.

DuFour and Eaker write, "Without credibility and trust, there are no followers" (1998, p. 193). Principals can earn the trust of their staff by focusing on defined vision plans, rather than jumping from one innovation to the next. Bryk

and Schneider found a strong link between relational trust and professional learning communities. Trust functions as the social glue for a professional learning community, which in turn supports school improvement initiatives. This study has provided a good opportunity to observe the trust that exists among the CTIPs, principals, and school division administrators as they voluntarily participate in the V-LIT II initiative.

Professional Learning Communities

> We argue, however, that when schools attempt significant reform, efforts to form a schoolwide professional community are critical (Louis, Kruse, & Raywid, 1996, p. 13).
>
> If there is anything that the research community agrees on, it is this: The right kind of continuous, structured teacher collaboration improves the quality of teaching and pays big, often immediate, dividends in student learning and professional morale in virtually any setting. Our experience with schools across the nation bears this out unequivocally (Schmoker, 2005a, p. xii).

The basic structure of a professional learning community is a group of collaborative teams that share a common purpose. The team members learn from one another, fueling school improvement. This type of structure exists outside of schools as well, such as in science and medicine, where professionals are expected to continually learn from colleagues; in business it can be referred to as "team-based organizations," "communities of practice," or "self-managing teams" (Schmoker, 2005b).

The ability of schools to implement change depends largely on the organization's ability to develop a collaborative culture in the form of a professional learning community. A school that operates as a professional learning community is committed to continuous improvement, as its members engage in ongoing study and constant practice. These educators "create an environment that fosters mutual cooperation, emotional support, and personal growth as they work together to achieve what they cannot accomplish alone" (DuFour & Eaker, 1998, p. xii). Research on school improvement has revealed that collaboration is critical to the success of change initiatives. It has been described as the "single most important factor" for successful school improvement initiatives (Eastwood & Louis, 1992, p. 215), and has been deemed essential to advance the quality of teaching and learning by the National Commission on Teaching and America's Future, the National Board for Professional Teaching Standards, the Keys Initiative of the National Education Association, the American Federation of Teachers, the National Association of Elementary School Principals, the National Association of Secondary School Principals, and the National Staff Development Council (DuFour et al., 2005). Bringing teachers together on a regular basis allows teachers to reflect on their practice and evaluate new concepts. Collaboration goes beyond collegiality or discussing curriculum and teaching strategies. It is a group of teachers who meet

regularly to share, evaluate, and improve upon their lessons and strategies to help more students learn at higher levels (Schmoker, 2005a). Collaboration leads to improvements in teachers' instructional practice, and these improvements then enhance student learning (Leithwood, 2005; Leithwood & Riehl, 2003). The principal's job is to provide the necessary time, structure, information, training, and feedback for teachers for them to engage in reflection, planning, experimentation, analysis of results, and adaptation (DuFour & Eaker, 1998).

The professional learning community refers to the culture of the division, not just the culture of the school. The division takes the role of fostering a collective moral purpose, organizing the structure, providing leadership development, and providing opportunities for schools to learn from each other (Fullan, 2005). Given the opportunity to do walk-throughs and see what other schools are doing, principals can collaborate with other schools, as well as receive critical feedback from each other. District culture improves when schools can learn from each other. Rosemont County attempted with V-LIT II to bring together principals and CTIPs from different schools to collaborate at the division level, in addition to the collaboration that might be happening at the school-building level. Any study that examines school change must also examine the degree of collaboration occurring among the schools in a division as well as within the schools.

Underlying this professional learning community is the importance of the relationship within the schools between the technology coordinator and the principal. "The positive peer relationships and collaborative culture of a professional learning community promote the sharing of knowledge as teachers refine their practice" (Fullan, 2001a). Strong relationships that promote collaborative teaching practice are necessary for successful change in classroom instructional practice (Milone, 2000). Effective leadership by the principal will also empower those closest to the action, as the principal leads from the center, rather than from the top (Dufour & Eaker, 1998). The communication between the principal and the CTIP is a crucial part of the change process. Research studies on innovation have shown the importance of communication for the dissemination of new initiatives (Kouzes & Posner, 1987). When so many sources of professional development are seen as external, the efforts of the CTIP as a building-level resource can be invaluable in contributing to the view that professional development does not have to take place away from school. "Teachers learn best from other teachers, in settings where they literally teach each other the art of teaching" (Schmoker, 2005b, p. 141). Successful change initiatives are characterized by knowledge creation and sharing. Turning information into knowledge is a social process, based on relationships, thus leaders should create conditions for this knowledge to happen by removing

barriers, creating mechanisms for sharing, and rewarding those who do share (Fullan, 2001a).

In many traditional teaching environments, teachers are isolated, spending their precious free periods in their classrooms planning or working with individual students. Busy teachers may have little time for professional collaboration. The structure of a learning community is not enough in itself; a leader must ensure that the learning community is focused on the right things: "The role of the leader is to ensure that the organization develops relationships that help produce desirable results" (Fullan, 2001a, p. 68). It is the leadership that can determine whether a professional learning community can develop to support student learning in a positive way.

A professional learning community views change as a process, not as an event. In a professional learning community, time, resources, and support are provided in order to make a change in classroom instruction, rather than taking the approach of simply sending teachers to workshops. In the case of technology, teachers would be provided with time to learn the technology, access to technology resources, and continual support such as provided by a CTIP. Technology integration would be viewed as a process by a professional learning community.

The role of the school district in developing professional learning communities is to provide leadership and support to the individual schools. DuFour and Eaker (1998) give examples such as:

- Providing time in the school day and school year for teachers to work together on issues of teaching and learning
- Developing structures that help teachers determine the purpose of their collaboration and the results it should produce
- Training staff in collective inquiry, team building, establishing group norms, and reaching consensus
- Insisting that schools use a staff development training model that incorporates guided practice and coaching
- Modeling collaboration with other community agencies and with the schools themselves
- Conducting districtwide action research projects
- Providing incentives for experimentation
- Recognizing innovators

An essential characteristic of a learning community is shared understandings and common values:

> What separates a learning community from an ordinary school is its collective commitment to guiding principles that articulate what the people in the school believe and what they seek to create. Furthermore, these guiding principles are not just articulated by those in positions of

> leadership; even more important, they are imbedded in the hearts and minds of people throughout the school (DuFour & Eaker, 1998, p. 25).

Community begins with a shared vision. Professional learning communities actively move visions into reality, believing that engagement and experience are the most effective teachers (DuFour & Eaker, 1998). Dufour and Eaker's work on professional learning communities has informed many of Rosemont County's initiatives. V-LIT II was an attempt to build a professional learning community with technology as the focus. A learning community such as this can take place on two levels: at the building level, with teachers, the CTIP, and the principal, and at the district level, with Rosemont County administrators, principals, and CTIPs. A learning community focused on technology leadership would ideally begin by trying to build a shared vision for technology use in each school by creating school technology plans together, one of the original goals for the V-LIT II project.

Planning and Communicating a Vision

The International Society for Technology in Education (ISTE) has identified essential conditions required for implementing the National Educational Technology Standards for Administrators (NETS-A). The first of these listed is shared vision**:** the school board and administrators must provide

proactive leadership in developing a shared vision for educational technology among school personnel, parents, and the community (International Society for Technology in Education, 2002). This local vision, unique to the culture of each school, should be driven by the school's vision for instruction. In creating this vision, it is essential to involve the technology coordinators who have first-hand knowledge of what is working or not working at the school already with technology.

Bryk and Schneider (2002) argue that the principal's articulation of a compelling vision and the steps taken to make it happen "go a long way toward fostering a collective sense of engagement among a faculty in social activity of moral value. Such behavior speaks directly to the integrity dimension in teachers' discernments about trusting their principal" (p. 29). Evidence suggests that the leadership practices of setting directions account for the largest proportion of a leader's impact (Leithwood et al., 2004).

Vision provides an organization with a sense of direction, providing a realistic, credible, attractive future. A vision statement articulates this future, motivating members to work together to achieve this reality. If a school is unable to articulate the outcomes they are trying to achieve, then they are also not able to offer evidence that they are accomplishing their goals, nor are they able to celebrate short-term wins (DuFour & Eaker, 1998). The process of developing this

vision statement must involve co-creation, in order to result in ownership by the learning community (Dufour & Eaker, 1998).

With the numerous and sometimes conflicting images of how schools should function presented by reformers and critics to school districts, the process of developing a shared vision statement has been troublesome. The best way to prepare a vision statement is to be sure that both the district and the individual school play a major role in its development:

> The district should initiate discussion by bringing together representatives of each school. These representatives, in turn, should be specifically charged to involve their colleagues in discussions of what the district's schools should strive to provide for the community as a whole. Once this common district statement has been developed, it should be reviewed and endorsed by each school. Then the personnel in each school should be asked to develop their own statements of what they hope their individual schools will become. These statements should also be consistent with the district's vision for all of its schools. In short, the district should provide an umbrella statement that gives direction to all of its schools, but should also ask each school to develop its own answer to the question, 'What do we hope to become?' The response should be congruent with the district statement. This strategy offers the best hope for both consistent direction throughout a school district and teacher ownership of the final product (Dufour & Eaker, 1998, p. 67).

The creation of a technology plan would bring together administrators, board members, teachers, parents, and the technology coordinator:

> Any school or district that wants to make sure technology expenditures have the intended impact for students and staff must have a carefully developed technology plan. This plan represents a three- to five-year road map of where the school or district wishes to go with technology. It also represents the results of many conversations among board members, administrators, teaching staff, and people in the community regarding

> how technology can support the learning process and how pedagogy and the learning environment must change in order to make better use of the tools available and provide richer experiences for students. The technology coordinator plays an important role in fostering and sustaining these conversations (Frasier & Bailey, 2004 p. 125).

John Kotter (1996) of the Harvard Business School identified the eight most common mistakes in the change process, among them underestimating the power of vision. A shared vision provides direction so that members of an organization are able to act without checking constantly with supervisors for assurance about decisions that need to be made. They can ask if this action is consistent with the vision plan. Having a clear sense of purpose and direction enables educators to understand their own roles, and empowers them to make decisions with greater confidence. Principals of professional learning communities understand that they cannot be the only problem-solver in the school, and that staff must feel ownership in a vision plan in order to identify and solve their own problems in accordance with the vision. Authority for decision-making should rest with those closest to the problem.

Additionally, the communication of this vision is a crucial part of the change process. Research studies on innovation have shown the importance of communication as the "veins and arteries of new ideas" (Kouzes & Posner, 1987, p. 56), and without sufficient attention to communication on a daily basis, even the best-laid vision plan will stall. One of the ways in which this can be

communicated is through modeling. A school that is trying to promote collaboration among its teachers will have better success if the principal is modeling collaboration.

A school that communicates its vision plan sends a message about its priorities. Not only communicating, but monitoring the progress of the plan indicates what is important: "When a school devotes considerable time and effort to the continual assessment of a particular condition or outcome, it notifies all members that the condition or outcome is considered important" (DuFour & Eaker, 1998, p. 107). For example, assessing teachers on their use of technology sends a signal that technology integration is important.

A review of the research available on educational leadership found evidence that defining mission and goals are among the most influential activities a school leader can practice (Leithwood, 2005). People are motivated by compelling goals and a sense of purpose, communicated to them by a leader.

Summary

The purpose of this literature review is to establish the conceptual framework of what we already know about school change and leadership, and how technology applies to these leadership and change models. There is a

noticeable absence of literature on leadership development for technology coordinators and on their relationship with the principal, thus it has been necessary to cast a wider net and rely more heavily on literature about leadership and its relation to school change. Much more empirical evidence is available about the instructional leadership of principals than about the leadership of teachers (Leithwood, 2005), and there is "almost no evidence concerning the relative effects of leaders in each position…we know little about such critical matters as how these two sources of influence interact in schools, how they might work synergistically to add value to the school" (Leithwood & Riehl, 2003 p. 15). The absence of significant levels of empirical research on distributed leadership makes it difficult to duplicate "best practices" (Bennett et al., 2003). Scholars have been arguing for studies that look beyond the top tier of leadership in organizations: "Understanding leadership practice is imperative if research is to generate usable knowledge about and for school leadership" (Spillane, 2005, p. 143). Additionally, the literature on technology in education generally focuses on infrastructure rather than leadership (Anderson & Dexter, 2005). My research questions attempt to address this largely unexplored gap in the literature, and this in the future may identify strategies of innovation and support.

In a 2004 interview, ISTE CEO Don Kenezek stated:

> It is also critically important that the leadership, the vision, the drive for the use of technology not come from any one individual. There must be a

> shared vision, shared impetus, and shared effort. We know that our superintendents are usually in their last years of their careers, so you can have a wonderful leader and visionary in the superintendent's role, but if that vision has not been built from a common understanding and consensus that goes much deeper into the community, the efforts there are going to be lost. Leadership clearly is an inclusive activity when it comes to integrating technology across the system (Stephenson, 2004, p. 8).

Recent evidence has suggested that a leader's emotional intelligence, such as the personal attention devoted to a teacher or the relationship with staff, increases motivation, performance, and a sense of purpose among employees (Leithwood, 2005). Additionally, a distributed leadership model where roles and knowledge overlap leads to interdependence and greater opportunities to learn from one another (Leithwood, 2005). Leadership is earned and emerges from the relationship between the leader and the others (Leithwood & Riehl, 2003): "…it is not the actions of individuals, but the interactions among them, that are critical in leadership practice" (Spillane, 2005, p. 144). Leaders act according to the situation and the actions of others; it is in these interactions that leadership practice is constructed, creating a reciprocal interdependency. These interacting components must be understood, as the sum is greater than the component parts (Spillane, 2005).

Research Questions

The review of the research literature resulted in questions for this study that focus on the essential conditions for leadership. For example, current literature on leadership has focused on relationships, the trust that binds them, and the learning communities that are formed as leadership is distributed among the members of an organization. The school division of Rosemont County embarked on this V-LIT II initiative because they wished to encourage these relationships, and they believed it would aid in their efforts towards technology integration. Additionally, the DuFour and Eaker (1998) work has been influential in the division, and nearly all CTIPs and principals have read their publications on professional learning communities.

Thus, this research focused on the question of:

- What are the defined and operational roles of the CTIPs and principals at each school with regards to technology leadership? How can the relationship between the principals and the CTIPs be characterized?

Additionally, because of the lack of literature in this area, the following questions were also a focus of this study:

- How is technology leadership defined by the teachers, CTIPs, and administrators of Rosemont County?

- What processes and outcomes do these principals and CTIPs expect from the V-LIT II technology leadership project, and to what extent do they feel V-LIT II is meeting their needs?

CHAPTER THREE

METHODOLOGY

The subject of this study was an investigation of the technology leadership of the principals and technology coordinators at schools participating in the V-LIT II initiative. Factors that promote or inhibit technology leadership, as well as a definition of technology leadership, emerged from the viewpoints of the participants as well as from the literature. By using methodological triangulation, the fallibility of any one method of research has been reduced. This study used both qualitative and quantitative measures to achieve convergent validity and a more complete understanding of technology leadership among participants. Data were collected in the forms of participant interviews, observation, document analysis, and surveys. Each data source will be more thoroughly described in the sections that follow.

Site Description

Rosemont County

Rosemont County Public School Division is located in central Virginia, surrounding a university town of 45,000 people. 80,000 people live in Rosemont County, with the school division serving approximately 12,000 students and employing approximately 1,100 teachers. According to the Rosemont County Public Schools website, 79% of those students are Caucasian, 13% are African American, and 8% are labeled as "other." The school division reports that 92.3% of residents with children currently attending Rosemont County Public Schools report satisfaction with the quality of education their children are receiving. The school system is comprised of 16 community-based elementary schools, 5 middle schools, and 3 comprehensive high schools. The student-to-computer ratio in the division is 4:1 or better, and all schools meet the minimum hardware specifications required of middle and high schools by the Virginia Department of Education. According to the County's 2004-2007 Comprehensive Technology Action Plan, they are currently piloting a new technology distribution model, with increased access to mobile computer labs and wireless networking, a robust distribution of computers for research, publishing, and check out in media

centers, and the provision of self-contained projection systems (wireless, networked computer, projector, and cart) for teacher check out in support of whole group instruction and presentation. More than 400 teachers have individual class web pages, and in the 2004-2005 school year, 523 courses were supported by the division's web-based courseware server. A Wide Area Network upgrade installed in 2003 has provided a more reliable infrastructure to support the division's administrative and instructional technology requirements. Rosemont County has a high commitment to technology in their schools, and has targeted the areas of support services, infrastructure and connectivity, professional development, instructional integration, digital content, and information processing and communication as goals for areas of improvement.

Rosemont's CTIP Program

One of the methods Rosemont uses to achieve these goals is through their commitment to the CTIP program. Rosemont first introduced Instructional Technology Specialists (ITS) to the County schools in 1994. Three teachers were hired to travel to five different schools each to assist teachers one-on-one with technology. In 1997, principals requested control of the staffing allotment to manage from their own buildings. While schools were given this authority, the

technology staffing allotment from the central office remained at .2, sufficient for support only one day a week. Schools used this allotment in various ways, and in many schools the ITS position eventually disappeared.

Teachers, however, continued to voice their desire for technology coaches, especially in light of the Virginia State Department of Education requirements for teachers to become proficient in technology. The Virginia Technology Standards for Instructional Personnel (TSIP) certification is tied to licensure renewal, and provided enough sense of urgency for teachers to put pressure on principals and the school division to provide more support for technology training (Scot, 2005).

Rosemont conducted a division-wide self-assessment survey, conferred with other Virginia school districts, and consulted the published research. It was apparent that workshops were not effectively transforming classroom practice, and they were poorly attended. In 2001 Rosemont piloted a model of providing technology support at the building level on-demand. In this model, principals used at least .3 of their own staffing allotment, and the division technology office contributed .2 of a staffing allotment, hardware, and training for the newly formed Curriculum Technology Integration Partner (CTIP) group. The school's administration had control of the hiring and supervision, and "buy-in" by contributing staffing allotment and electing to participate (Scot, 2005).

The new CTIP position emphasized curriculum, rather than technology; the CTIPs generally are former classroom teachers, who receive additional technology training from the division's Office of Technology. Currently, each CTIP is attached to no more than two schools (in most cases, just one) and fulfills a variety of roles in the building. Among schools, there is variation in exactly how the CTIP model is implemented, but overall they act primarily as mentor teachers, partnering with the regular education teachers on curriculum projects that often involve the use of technology. They model technology-rich lessons, coach teachers on creating projects and infusing units with technology, and assist the teachers in gaining technology competence for increased teacher productivity and student learning. The CTIPs meet together as a group regularly for training and support. As the program matured, the CTIPs felt more confident in their technology skills, but began requesting assistance with their new roles as mentors and leaders in the schools.

Meanwhile, in the 2002-2003 school year, principals from Rosemont County participated in a series of optional Virginia Leadership in Technology (V-LIT) and TSIP workshops for school division administrators. V-LIT is a program of the Gates Foundation Technology Leadership Grant, granted to each of the 50 states in order to provide principals and superintendents with leadership development on systems change and technology integration. The workshops

conducted for Rosemont County focused on discussions of the NETS-A, principles of technology integration, understanding the results of the Taking a Good Look at Technology survey, and using tools such as PowerPoint, Excel, and Outlook. Following the V-LIT workshops, principals expressed their desire to work further on learning how to lead their schools in technology integration.

Hearing the CTIPs and the principals voice their needs for further support in their roles, Tammy Peters*, Assistant Director for Best Practices in Rosemont County, approached the Curry School of Education at the University of Virginia to see how these concerns might be addressed.

V-LIT II

Through conversations with the V-LIT director at the University of Virginia, it became evident that an initiative involving both the principals and the CTIPs would be of interest to V-LIT, despite the fact that this had never been done before. This initiative became known as "V-LIT II," and set as its goals to provide structured time for shared experiences between the principal and the CTIP to develop a deeper understanding of the role that technology can play in a school to foster improved student and teacher performance. A memo of understanding and a projected timeline was drafted for 2005 events, to include:

* The participants' names have been changed.

- Participation in three project meetings
- Development and execution of a collaborative professional growth plan aligned with TAGLIT results, NETS*A and some artifact (School Improvement Plan, Teacher Performance Appraisal rubrics, School Board/Superintendent Priorities, etc.) of work currently in progress at the school
- Attendance at the National Educational Computing Conference
- Attendance and presentation at the Virginia Department of Education Educational Technology Leadership Conference
- Attendance hosting up to three site visits as requested by project coordinators

In January 2005, Tammy Peters and Tom Byers, Coordinator for Instructional Technology for Rosemont County, visited each principal and CTIP who had responded to their email about V-LIT II. Seven CTIP and principal teams agreed to participate. Several attended V-LIT II meetings and the National Educational Computing Conference over the summer. Changes in the school placements of four of the V-LIT II participants, as well as some shifting in the Rosemont County administrative offices, put V-LIT II on hold for the fall. While most CTIPs normally attend the Virginia Department of Education Educational

Technology Leadership Conference, no principals attended. The County held a V-LIT II meeting in January, 2006.

Rosemont County was chosen as the site for this study because they are unique in this V-LIT II initiative. With the self-reflection and activities surrounding V-LIT II, this was an ideal site for studying the aspects of technology leadership not explored in previous research, particularly the leadership of the technology coordinators, their relationship with the principals, and definitions of technology leadership.

Participants

Seven schools committed to participate in the V-LIT II initiative. The CTIPs and principals (or, in a two cases, the assistant or associate principals) were from five elementary schools, one middle school, and one high school. For the purposes of this study, all assistant and associate principals are referred to as principals. Over the summer two participating principals were moved to positions at other schools within the County and one to a central office position. One CTIP left the County and was replaced by another teacher from the same school. This created a shift in the number of participants as well as a change in the principal-CTIP pairings.

Other key participants in this study include Tammy Peters, Assistant Director for Best Practices. She and Tom Byers, Coordinator for Instructional Technology, were the two administrators in Rosemont County responsible for making the V-LIT II initiative happen. They work closely with the CTIPs and principals on a regular basis. Also participating in this study is Pat Murphy, project director of the V-LIT grant at the Curry School of Education. He has worked with Rosemont County before in their previous V-LIT workshops, and was involved in the funding of V-LIT II.

A list of participants is included as Appendix A. The names of the Rosemont County participants, the schools, and the school district have been changed for the purposes of confidentiality.

Data Collection Methods

This mixed-method design was chosen because it builds on the strengths of both quantitative and qualitative data to help provide a more complete picture. The best understanding may result from using quantitative methods for things that can be quantifiably measured (such as Likert Scale responses measuring technology policies in place, access to computers, etc.); qualitative measures are used to seek deeper understanding of the ideas and experiences of the participants. While generalizing the data from qualitative studies can be

problematic, it retains an advantage in discovering the nature of technology leadership, the dynamics of interacting individuals, the effects of cultures and the impact of contextual factors (Bennett et al., 2003). Descriptive theory building is needed before any causal links between technology leadership, instructional improvement, and student outcomes can be established (Spillane, 2005), thus more weight in this study was given to the qualitative data. Additionally, qualitative data is necessary to provide an interpretive framework to understand the perspectives of the participants and the effects of leadership on them.

Interviews

In January 2005, I conducted interviews with each of the seven CTIPs and seven principals who agreed to participate in V-LIT II, using the question guide attached as Appendix B. All interviews took place in the principals' and CTIPs' own offices, and lasted approximately 30-45 minutes. A digital recorder was used in each interview, generating a file that was later transcribed for analysis. Institutional Review Board approval was obtained for these interviews, and informed consent signed by each of the V-LIT II participants.

In December 2005, follow-up interviews were conducted with each of these CTIPs and principals. Again, interviews took place in the offices of these participants and lasted approximately 30-45 minutes. In the case of three

principals, the interviews were conducted at their new placements, as they had changed placements over the summer. The CTIP from one of the participating schools had left the County, and was replaced by another teacher from the same school; I interviewed this replacement in December, as she was considered by Rosemont County to be a V-LIT II participant and had attended the summer meetings and conference. These interviews focused on relationships with other participants and their experience with V-LIT II thus far; additionally, they were asked for their own definition of technology leadership, as well as follow-up items that resulted from the previous round of interviews. The interview guides for these interviews are included as Appendix B and Appendix C.

Interviews were also conducted with the Assistant Director for Best Practices in Rosemont County and the V-LIT project director. Just as with the principal and CTIP interviews, these interviews were conducted in the interviewee's natural environment (their offices), and recorded with a digital voice recorder for transcription and analysis. The purpose of these interviews was to contribute to a fuller understanding of the views and experiences of the participants. Questions were generated from themes that emerged from the literature on technology leadership, with a focus on the NETS-A.

Observation

During January of 2006, an observation was conducted of a V-LIT II meeting in order to collect data on the V-LIT II project in action and on interactions among the study's participants during a rich discussion on technology leadership and the project's goals. Because all of the participants signed a consent form, the meeting was audio recorded and transcribed for analysis.

Document Analysis

Pertinent documents were collected during this study to give a more complete picture of technology integration and leadership in the Rosemont County schools. These documents included district and school technology plans and improvement plans, training materials provided to CTIPs and principals, and CTIP job descriptions.

TAGLIT Survey

In February 2005, V-LIT II participants were asked by Rosemont County to complete the Taking a Good Look at Technology (TAGLIT) survey, available online at www.taglit.org. This instrument was developed by educators participating in the "Principals as Technology Leaders" program at the

University of North Carolina to assess schools' use of technology, and was used throughout the Gates Foundation Technology Leadership Grant participating schools until funding for the TAGLIT survey ceased in December, 2005. The survey generates data on the planning process, technology plans, hardware, software, technical and instructional support, technology policies, funding, community connections, and technology use in teaching and learning. There are no validity or reliability data available for the TAGLIT survey. Each V-LIT II principal and CTIP was asked to take the portion of the survey designated for school leaders, which focuses on technology planning and policies, as well as available hardware and support. The CTIP and principal responses from each of the four schools that completed the leader portion of the survey were compared to determine if there was a high or low level of agreement among answers. For example, if there are discrepancies between the CTIP and principal surveys, it may indicate that the CTIP is unaware of the budgeting for technology, or that the principal is not knowledgeable about technology use in the school. This survey provided evidence of the communication level and the relationship between CTIPs and principals. A sample of TAGLIT questions has been included as Appendix D and the responses as Appendix E.

Teacher Survey

A brief online survey I developed was administered to teachers at the schools participating in V-LIT II to include their valuable input in this study, and is included as Appendix F. This survey consisted of five questions that addressed technology leadership, technology planning, collaboration, the atmosphere of risk-taking at the school, and expectations of teachers using technology. Results were aggregated to help discern general patterns and variation.

Data Management

All interviews and the V-LIT II meeting observation were recorded on a digital voice recorder. These files were saved to a computer for transcription and then imported into NVivo qualitative analysis software. The audio files were deleted following analysis of the data. Printed materials were kept in a binder.

Names of all Rosemont County participants, schools, and the school division were changed to protect the confidentiality of those participating in this study.

Data Analysis

Using the qualitative research model of Huberman and Miles (1994), the semi-structured interview questions were chosen at the beginning of the

research, based on the literature in this area. Analysis sought to discover the relationships, causality, and structure among the phenomena studied. The process focused on data reduction, data display, drawing conclusions and verification. Analysis was concurrent with data collection and continued throughout the study.

The interviews, observation, and documents were coded using NVivo Qualitative Analysis software. Codes were created based on the themes identified from the semi-structured interview questions of the January 2005 interviews (see Appendix B) which were in turn based on a start-list created prior to interviews. This start-list emerged from the literature, particularly the NETS-A. These first-level codes named and classified what was in the data of the interviews. In the process of coding interviews from January 2005, data was reduced to that which applied to each code. Analytic memos were written and linked to each interview as a place where I put my thoughts and hunches about how I would make sense of the data. Patterns and themes were noted among the data from different sources.

NVivo has a tool for the creation of reports, which can identify the codes that occur across cases and display this data together, with hyperlinks back to the original file, allowing the researcher to see the coded section in context.

The codes used in analysis were:

- Atmosphere of risk-taking
- Background
- Collaboration/professional development
- CTIP – Principal relationship
- Current technology use
- How SHOULD technology be used?
- How should technology NOT be used?
- Innovation overload
- Leadership
- Principal's use & training in technology
- Reasons for V-LIT II participation
- Relationship with the district
- Role of the CTIP
- Sustaining change
- Teacher evaluation on technology use
- Technology planning
- The role of the principal
- V-LIT II barriers
- V-LIT II activities

The quantitative portion of this study used descriptive statistics to determine the correlation of answers between the CTIP and the principal.

Validity

In order to address possible concerns with validity, triangulation of data collected from multiple sources was employed. Interviews, observation, surveys, and documents were all used to note patterns and themes. The different data were used to see if they corroborate each other. Additionally, using different data types (both qualitative and quantitative) and differing theories (leadership, technology integration, learning communities) assisted in triangulation.

Validity in qualitative research does not fit the same criteria as in quantitative research. For example, external validity, or generalizability, in qualitative research is achieved by providing transferability, thoroughly

describing the research context, and by generalizing findings to theory in current literature. Internal validity in qualitative research is referred to as credibility; how credible or believable are the research results from the perspective of the participants? It becomes important, therefore, to check back with participants when analyzing the data. Getting feedback from informants, or member checking, can occur to ensure that my interpretation of the data is in accordance with the interviewee's own conceptions. I was able to do this during my December 2005 interviews. Analytic induction was employed to test hypotheses that were produced from the data by asking follow-up questions in December, 2005, and reformulated as necessary. Lastly, I looked for negative evidence and rival explanations. Exceptions to the hypotheses need to be explained, or the hypotheses may not be valid.

Researcher as Instrument

Since 2003, I have had a very close working relationship with Rosemont County. For two years I served as director of the Technology Infusion Program (TIP), a partnership between the Curry School of Education and Rosemont Public Schools. I worked closely with Tammy Peters to place Curry School students with County teachers to work in K-12 classrooms for an internship. In this placement, the Curry student and the County teacher work collaboratively on a

technology project. I supervised these internships, and visited many of the County classrooms to observe my students.

This experience has given me the advantage of being familiar with the County and much of the language it uses when discussing technology integration. Prior to this study, I had no contact with the participating principals, and little contact with the CTIPs. Since June 2005 I no longer worked as the TIP director, and my official relationship with the County was solely in the context of this study.

I spent a lot of time with the CTIPs of Rosemont County, not only in the context of interviews, but also during the Virginia Department of Education's Technology Leadership Conference. As a former technology coordinator myself, I empathized with them, but found their working situations to be quite different, especially the community of CTIPs they used so well.

Having worked closely with Tammy and being familiar with her and the school division may have provided advantages, but my good working relationship with her may also have made it more difficult to be objective about her actions. I relied on triangulating data among the two interviews of 14 CTIPs and principals, the surveys of teachers, CTIPs, and administrators, and the document analysis. Additionally, reflexive notes were employed to question my assumptions.

CHAPTER FOUR

FINDINGS

Introduction

The focus of this study was technology leadership among the V-LIT II participants. The results of data analysis of interviews, observation, surveys, and document analysis are presented here. Following the model suggested by Huberman and Miles (1994), data has been reduced through coding and reporting, and displayed here in the forms of narratives and tables. Each of the major themes that emerged (the role of the CTIP, the role of the principal, the CTIP-principal relationship, technology planning, distributed leadership, collaboration, risk-taking, and trust) are discussed here in Chapter Four.

The Role of the CTIP

CTIP Activities and Responsibilities

The technology coordinator is a relatively new position, and many school divisions are trying to determine models to make the best use of this specialist. In Rosemont County, a CTIP's role encompasses a wide variety of tasks and a CTIP may have to tap into many different skills. Gary, a high school CTIP, refers to this as being a "jack of all trades":

> It's a fun job, it's an interesting job, and it just, the skills that you have to tap into every day, it's a wide range of a lot of different things. So I guess it's sort of a renaissance position if you will, in that you have to be a jack-of-all trades. I guess that's me.

During a typical day, a CTIP may be called upon to collaborate with teachers, lead a workshop, attend meetings, respond to many emails, locate resources for teachers, fix technical problems, work on the school's webpage, and make decisions about new hardware. A list of the CTIP's responsibilities, included as Appendix G, includes broad descriptions such as, "Assists teachers in obtaining, learning, and using educational technology resources to improve their instructional effectiveness," and "Collaborates regularly with the Library Media Specialist and teachers to support the integration of technology in the classroom." Several CTIPs described their daily activities:

> I go to team meetings… and I'll say, oh, you're working on energy, and I'll just send the one little thing, or show them in their meeting, look at this really cool website, or resource…There are some teachers that are very eager and they come to me and they want to know everything, and there are other teachers that are reluctant and you still have to get to them, and that's just finding one little hook, like check this out, you really have to know the teacher… One day I'm studying up for a demonstration for the Kindergarten Thanksgiving feast, and the next day I'm doing clay animation, I don't get bored (Connie, elementary school CTIP).

> Well, some days I'm glued to this laptop all day…In a school that's so large, just physically, and then the number of people that work here, there's no way that I could run around here all day… So I spend a fair amount of time, one to two hours per day, on email, and trying to inform people, and getting back with people, and following up on things, there's a lot of technology management that goes on with this position in a school this large, just kind of making sure that everything's running the way it should be running. ...there's no day that looks like the one before, it varies from day to day (Gary, high school CTIP).

A CTIP may have to spend time in the day being concerned about hardware issues; for example, Connie, an elementary school CTIP, described her process of acquiring LCD projectors and related equipment:

> I have up until two months ago we had one LCD projector in this building…Now we have three. But the problem with that is it's great, but I have to find a cart now to put my LCD projector on, and always to be able to keep it on that cart so that I can use it.…And so our next step is to see how can we get an additional one or two, how can we if it's in the budget to mount them from the ceiling... and then get a SMART Board that's attached to the wall so that we could just have a constant setup, rather than back and forth.

Additionally, CTIPs provide technology support directly to teachers:

> Well, a lot of it is based on someone will say, 'I've got these digital images on the camera and I want to put them in a slide show that runs when I

> have a teacher conference,' so that kind of thing, and that happens all the time…I'm doing a lot of stuff all the time (Ellie, elementary school CTIP).

> I have to go and rescue teachers, they lose their files still, and they can't find how to do this, just little quirks, and you'll show them over and over, and every so often, but at least they're coming in, at least they're not afraid to come to me (Alice, elementary school CTIP).

Dealing with issues with hardware and software, the "T" of CTIP, is only part of what a CTIP does during a day. Connie also talks about the other part of her job, which is to work with teachers who possess a wide range of skills and comfort levels with technology:

> I think there's a real mixed bag of that in the building. I know we've got a real wide range of that…People who are right out of college in the last two or three years, they just jump right in, whereas some people who have taught for a long, long time, and have wonderful expertise at teaching, are really phobic when it comes to technology...I'm trying my best to do some hand holding…It's personality driven too. [One] person also I think has that 'I don't want to admit that I don't know how to do this' veneer. But I've also let her know that's perfectly alright and that I will be more than happy to sit down with her and spend time with her. And then you've got middle of the road people who are trying new things … who are like, 'Oh wow, yeah I'll do this, but be patient with me.'

A CTIP has to be proficient in technology, people skills, instructional strategies, and management – not a simple job description by any means. One elementary school principal, Eric, summed up his CTIP's role in the school:

> She wears many hats. She's on our technology committee, she's on our School Improvement Committee, she has some leadership roles as far as helping staff learn the software and with the mechanics of technology, operationally she assists with things that are critical to student and teacher

> success, often she supports the teachers in the computer lab when they come in to do a project or work on something, she's there to support that. There's some other things she's involved with, she's our [Gifted Program] teacher, and in a way that kind of lends itself to the technology piece. And as kind of an advisor as far as equipment and software for all of us, she can kind of help bring about some ideas on the best use of things, and for what is out there that is better than others in terms of machines and software.

CTIP Variation across Schools

The CTIP's job varies greatly across schools. The size of the school is a important factor in determining the CTIP's role. Gary, for example, is a CTIP at a large high school:

> It's fun, the CTIP model, I think, is Curriculum and Technology Integration Partner, and a lot of times I think I'm a lot more T than I am C, it's because I'm one person, and I can't get out and individually plan those lessons, so I think someone that's in a school that's smaller is gonna have more hands-on, kind of helping develop the curriculum centered around technology than I'm going to be able to.

A CTIP like Gary is able to work full-time as a CTIP in one school, but has a stronger focus on technology than curriculum due to the size and the difficulty of being a content expert in multiple subject areas at the high school level. In a smaller school, a CTIP may be a part-time position, and the CTIP will either have other jobs at the same school, or work as a CTIP in two schools in order to be a full-time employee. Connie, for example, is a CTIP at two small elementary schools. She works one week at each place, since technology projects often

continue for more than a day and she is thus able to work with a teacher over several days on a project. This model can however provide its own challenges:

> What happens when I'm away from a school things pile up, and when I come back on Monday it's like crisis management, because there's a lot of things, I actually had people this past Monday point to me and go, 'There you are,' as if I was hiding, like I was purposely avoiding them, and I wasn't, I was at the other school, and there is more than enough work to keep me full time in both schools. I can't really do as much as I should, and it's kind of like the squeaky wheel.

Because the enrollment of the two elementary schools was fewer than 500 students, the County decided to split Connie's time between two buildings. This means that teachers who need Connie's assistance have to wait for her return to the building or plan well ahead to time their projects to coincide with Connie's week at the school. This leads to a lot of juggling for the CTIP as well, dealing with the management of two jobs as well as working with two different cultures. Connie provides an interesting perspective as to how the role of the CTIP varies from school to school:

> It's interesting, the two schools are very different, very different vision, different atmosphere, different focus, my role is very different in the two schools...I think it's the emphasis or the time that's different, that varies from that… it's interesting because the two principals use me very differently. Here's very much a leadership role.

Other elementary schools in Rosemont County have shared a CTIP, which is easier when the schools are geographically close together. Fran, a middle school principal, sees that model as beneficial, especially when the elementary

school with whom she shares a CTIP is located right across the parking lot. The current CTIP, however, works only part-time for the school division. In January 2005 I asked Fran about her current CTIP's leadership roles, such as being part of the School Improvement Committee. Fran discussed with me the difference between her previous CTIP who worked part-time at her middle school and part-time at a neighboring elementary school, and her current CTIP:

> *Is [the current CTIP] part of the School Improvement Committee?*
>
> She's not. The person before her was, that's the difficulty of her half-time status… those are night hours…
>
> *Was the person before her also half time?*
>
> Yes. So it's been a problem. The difference was the one before was half-time over there at that building, and could spend a great deal of time over here in the times that we needed her, and a great deal of time over there.

When CTIPs are physically at the school only part time, they become unavailable to work with teachers or serve on leadership committees. Elementary schools in Rosemont County are much smaller schools than the middle or high schools, and unless the principal makes the decision to find extra money in the school's budget to fund the CTIP full-time, the CTIP will either work in two different places (as Connie does), or hold down another position at the school, such as the gifted resource teacher or library media specialist. The two CTIPs who participated in this study and hold down the dual position of CTIP/library media specialist felt strongly that their roles work well together.

Beth, an elementary school CTIP, explained, "Really if you look at the CTIP job description, it's what a good school librarian should be doing anyway… because you're supposed to be showing people how to use multimedia tools in conjunction with what they're doing."

Debbie, another elementary school CTIP/library media specialist, also finds that these positions can work well because she is able to reinforce skills and strategies she would like to promote as a CTIP such as online research strategies with the students when she meets with them in the library:

> My thing was my two jobs, my dual role is that I'm most concerned with how research is conducted with laptops… But to try to reinforce it, do that in the library classes, so at least I know that somehow the kids are getting some kind of guidance with how do you search, and what's reliable, what's not reliable, that kind of thing.

In 2005, one of the monthly CTIP meetings held at the Rosemont County central office was joined by the library media specialists of the County. There is generally a close working relationship between CTIPs and the library media specialists, which might include working together on ways to support teachers on a curriculum unit, or it might be on acquiring hardware – often the library media specialist has a larger budget than a CTIP, and can work with the CTIP on acquiring hardware for the school.

> So I have to work in conjunction with the media center because they have a much larger budget than I do, and they purchase a lot of the LCD projectors, digital still and video cameras, things like that, so they help to

> provide the equipment that I'm going to be able to go into the classroom and instruct students on how to use the equipment, how to use the software, and then the teacher injects the content of it (Gary, High School CTIP).

While CTIPs who are also the library media specialists feel that holding both positions at the same time is advantageous, other CTIPs who hold multiple positions may find that it can also be problematic and difficult to balance:

> And oftentimes I do get, quite honestly, I think I have too many responsibilities in this building, so it does compromise a lot of what I do. And when I'm out of the building for conferences and my [Gifted Program] stuff gets compromised, and teachers, I play this kind of game all the time (Ellie, elementary school CTIP).

A few elementary school principals have concluded that it is important to have a full-time CTIP at the school and have provided money from elsewhere in the budget to make up the difference in salary. Alice is one of those CTIPs who originally began as a part-time CTIP with other roles in the school until her principal brought her up to full-time in the CTIP role. Her principal, Ann, "added to it to make Alice full-time, because [she] couldn't see how [Alice] could possibly do the job if she's not."

Expectations of the CTIP Role

Holding multiple positions at the school coupled with the fact that the CTIP is a fairly new position has led to some ambiguities and misunderstandings

among teachers about what the exact role of the CTIP is in the school. Beth, an elementary school CTIP commented, "So I think it's kind of hard because not everybody really gets what I'm supposed to do anyway, so that makes it a little bit difficult," and during collaborative meetings with teachers she often spends time "talking about kind of what my job is during these meetings."

In Rosemont County, the CTIP position was created with a focus on curriculum and the integration of technology into the classroom. In order to facilitate this, the County removed from the CTIP position the job of providing technical maintenance for the school, such as unjamming printers, getting people back on the network, and assisting with other miscellaneous minor computer technical support. This technical support position, referred to as the troubleshooter in Rosemont County schools, is often another teacher with some technical abilities who receives a stipend for work in helping with technical support. Many teachers, however, still come to the CTIP for help with fixing computer problems because they are unclear about the role of the CTIP. Beth found that so many people were coming to her for assistance with technical problems that in the fall of 2005 she decided to be the troubleshooter as well, so at least she would get paid for her time:

> I spend a lot of time doing troubleshooting during the day, because people want their stuff to work… Last year someone else was doing [troubleshooting] but it was really hard for the rest of the school to know who to go to for what, and I ended up doing about 85 to 90% of the

> troubleshooting anyway, I figured if I was doing it I might as well get paid for it, so I took that on.

Other CTIPs have also had to clarify their role as a curriculum specialist and not as the troubleshooter, such as Cathy, another elementary school CTIP: "I tell them to go to the troubleshooter so I'm not fixing mechanical things."

Another ambiguity in the CTIP role is the attachment to a lab. In many schools across the country and even still in some schools in Rosemont County, the CTIP or its equivalent is essentially the computer lab teacher, the person with whom teachers can drop off their students once a week for a lesson in the lab. Among the principals and the CTIPs in this study, there is a great resistance to this model. Beth replaced a CTIP who worked in a lab model, and has had to put some effort toward redefining the CTIP role as someone with a greater focus on curriculum and helping teachers to learn how to integrate technology into their lessons:

> It was really hard to take over for someone who… had been the lab teacher when there used to be lab teachers…
>
> *So people would just drop their kids off?*
>
> Yeah. And so I worked on getting that across last year, but this year I've really I think been able to do that a lot more and really gotten them to understand that the CTIP role isn't me teaching their kids, it's me helping them think of other ways that they can teach their own kids. Which is sort of working so far.

Alice has been a CTIP for four years, and feels strongly that her time is better spent if she avoids a lab model. Her former principal, Ann, speaks about Alice's views on a lab model:

> Alice tried very hard to not be in the lab. She had a flexible schedule, people were required to sign up… [We] never had a lab model where somebody's in a lab and teachers send the kids and drop them off ever, so the staff was trained very early on… There were no preconceived notions that Alice would take a class in there, so they already just understood that it was their job to use technology as a tool for learning, and that everything's about the curriculum, not about technology in and of itself.

It does not necessarily follow that if a CTIP is connected to a lab, the CTIP will function in the role of teaching a group of students who have been dropped off by a teacher. At Ann's new school the CTIP is tied to a lab, at first a matter of concern to Ann, but Ann observes that the CTIP Abby is able to both be tied to a lab and to team-teach with the teachers at the school:

> What Abby did was take the class in the lab, it wasn't a drop off class, so for instance the teacher couldn't just go in there and leave the kids, and say, 'Oh by the way I'll be back in 30 minutes,' they were required to stay with her, so people who were really shy or, you know people are scared of computers… they sat and they watched for a while, and Abby started drawing them in… I came from the Alice model, I come to this school, and everybody has a scheduled time, and I thought, how am I going to change this, without just creating huge angst, and making the CTIP mad as hell at me, and all of that. Well, it might not be as hard as I think eventually because what's happened, is that people go into the lab with Abby and they team-teach in the lab, and they will stay in there, and now that we're getting more SMART Boards and laptops and more technology in the building, people will go and just get it, and use it in their room, and Abby doesn't have to be with them, and that's the goal is for people not to have to have Abby. And she's there and more flexibly used, and I see that, it seems like that's evolving. Because she won't baby-sit, that she's said. And

> that's what I was worried, is that she was turning out to be maybe a babysitter, but she's very strong willed, and she has very firm ideas about responsibility, and she doesn't allow that to happen. They just don't drop them off. You never go in there and just see Abby teaching a class. I can't even think of one time I've been in there this year where Abby was just teaching a class, so they're always team teaching together, and so the teachers are learning, and the kids are learning, and so I see it kind of evolving.

Ann highlights the importance of a principal understanding the role of the CTIP. Here, she had an initial reaction against Abby's role as a CTIP who is tied to a lab, but not in a drop-off model. After conversations and observations, Ann came to see how Abby's role still fit in the model of a CTIP who is focused on curriculum and helping teachers to integrate technology. It is important for principals to understand the CTIP role, and conversations and a relationship are necessary for this to happen. Pat Murphy, the project director of the V-LIT grant, sees that the ambiguity of the role of a CTIP resides not only with teachers, but also with administrators:

> CTIPs are brand-new, a lot of them don't know where they fit yet, and a lot of principals don't know where they fit yet… Some principals might be thinking oh good, this is a school-focused tech support person, or good, I don't have to do technology anymore, now the CTIP person can do it… There's some who are still not sure themselves of what technology integration is supposed to be all about in the bigger picture. … There's not a pre-painted structure for where they fit… we're trying to figure out where they fit in that big puzzle, so I think it puts the burden on them in a way, to find themselves a fit. But I think that also puts a burden on central office staff, administrative staff to say where is this person's best fit.

Beth echoes this sentiment when talking about the ambiguities of her position as a CTIP:

> I think the hardest part with any of those jobs is that the principals understand what your job is really about, and they understand what the ideas and ideals for that job are beyond that building, and I think that with librarians and CTIPs is kind of a hard thing to get communicated, because every school has kind of a different idea and picture of what that job should be, and I don't think there's a huge amount of consistency. And part of the reason is because everyone's coming to that job from different backgrounds, and people have different specialties, and most CTIPs have a second job, they're either the CTIP and literacy specialist, or the CTIP and whatever, so I think really having some kind of consistency and really communicating to the principals and the administration what that job is supposed to look like, because we'll all sit in a meeting and talk about how we can affect this and that, and what our role can be, and we get back to our own building and we're just one voice, and we can't be it, it's got to come from somebody above us, new ideas and new initiatives, because if it's just us, then it's not all that effective.

According to both Pat Murphy and Beth, it is not only the CTIPs who must work on defining the role of the CTIP, but also the principals and the County administration. With a position that is relatively new in the County and is defined differently in each school, it is a challenge to create the boundaries of the CTIP role.

CTIP as School Leader

CTIPs generally meet together as a group once each month. During this time, they meet with Rosemont County administrators, and are often among the first in a building to be trained in new County initiatives. Many of the V-LIT II

principals and CTIPs have frequent meetings (See Table 2). Additionally, CTIPs have close and frequent contact with most of the teachers in a school building, and are in many classrooms on a daily basis. Being able to interact with County administrators, principals, and teachers in such close relationships is unusual in a school system, and allows a CTIP have the potential to be a global change agent. The CTIP program "is meant to be a systemwide approach to integration of technology" (Ann, elementary school principal).

> I think the neat part about just the community of CTIPs is that… [Rosemont County administrators] really make sure that we have a good big picture of what the County's goals and plans are, and I don't feel like that necessarily gets that filtered down to everyone else. [Our school has] meetings about, well this is what the new plan is, and everyone gets so worried about it, and I think, well it didn't sound like such a big deal when I heard about it… I feel like teachers got a lot more intimidated and worked up about new stuff being introduced than I thought they would, and I think one of the reasons is because when it was explained to the CTIPs as a group, it was shown as this big picture, and it made sense, and it was explained to us really early, so I had heard about it three or four times before it was talked about in a staff meeting… And I'm not sure how it was talked about differently. But it was, it made sense, and it seemed perfectly logical. And [teachers] freaked out. But with the CTIP group, everyone was sitting there saying, oh, of course, that seems perfect. That's going to work great….We get all of this information together as a group, where it gets passed back and forth and so I feel like we see what's going on, and have heard about it. I've mentioned things in meetings about… 'This is how it was explained to me,' and people look at me and say, 'We didn't know that.' I think there were just so many things going on and so many other things that teachers have to think about, I don't give tests, I don't have to worry about report cards, and I don't have parents coming to me and complaining, and so I go to a lot of meetings and we have this emailing circle of CTIPs who keep each other up on what's going on, and resources, and ideas and suggestions, and classroom teachers don't have that. So I think sometimes they are surprised that even though

> I'm not in the classroom, I know a lot about what's going on. (Beth, elementary school CTIP).

Beth argues that CTIPs are in a position to facilitate technology integration, as well as any curricular initiative that the County is trying to introduce. Rosemont County has made sure that the CTIP group is among the first to be introduced to County initiatives, and they are able to work directly with teachers to explain the County's vision. CTIPs, with their ability to interact with County administrators, CTIPs from other schools, principals, and every teacher in their building are in a unique position to have a "bird's-eye view" of what is happening in the school district and see the bigger picture of a plan:

> A lot of the communication is through me, because I am able to be in all the different classrooms, I have more of a birds' eye view of what is happening in terms of technology (Fay, middle school CTIP).

> I have to say that this County overall has not been one to put stuff [computer hardware] before good pedagogy and just good teaching, so sometimes when people, when teachers complain about things, being in this role of CTIP, I understand, I see things in a little more global way. So I'm kinda like, you know, it's not about the stuff, it's more about what we're doing (Alice, elementary school CTIP).

V-LIT project director Pat Murphy discussed how this position of a CTIP can be that of an influential leader in the school because it is one that hasn't been created before and may have the potential to fill "this gap between leadership and classroom level, and so maybe the CTIP can be that person that can help

squeeze the gap." While the CTIP is not a classroom teacher nor a school administrator, they can support teachers in ways that an administrator does not:

> The principal can give me signatures, time off, and a global vision, and then expect me to make that stuff happen, turn it into concrete activities. So I would want to say, 'Ok, help me take the vision and marry it with my classroom management expertise.'… So I think it puts the burden on the CTIP-type person to sort of wave back and forth and finally find that middle ground that says, I can't be in charge of this school, I can't solely set the vision for this school, but I can help set the vision, I can take the vision and meet a classroom teacher halfway, and say I need you to inform me of your instructional goals and your objectives and the activities that you want to do, what I can do is be the broader picture, pull you forward a little bit to the broader picture and also keep the broader picture pulled close enough to the classroom level so that it doesn't get carried away. I think it's a difficult job, I think it's a great job … because on one side of the scale you've got the principal, and on the other side you've got all the teachers, so you're the one who's trying to keep that thing balanced between the bigger picture of vision, and the bigger reality of standards-based test-driven world. (Pat Murphy)

CTIPs, particularly ones with backgrounds as a classroom teacher, can be this bridge between vision and classroom practice. Alice, an elementary school CTIP, discusses the process of learning to be in the position of leading when the County hired her as a CTIP four years ago:

> I guess the thing that I was not prepared for was being thrown into almost an administrative position and seeing things for the first time, seeing teachers in a different light, 'cause when you're in your own classroom, you're somewhat isolated to a certain degree, you assume you know what's going on in other people's classrooms and that was one of the hardest things, when you witness things that you did not like, or agree with, or strategies, and that was very awkward and it was very hard and I really was not prepared for that. And that's a role that I'm still growing in, it's just the balancing of trying to lead someone in a different way but still

> be their trusting friend, and colleague, and mentor, so it's a real fine balance, because I'm not an administrator, but I'm not a classroom teacher, but yet I always have to remember, and they know that I came from the classroom, and I don't ever forget that I came from the classroom and I always try to bring that part of me with me when I'm working with them, and empathize in the issues that they deal with daily.

The CTIPs interviewed for this study all felt that they were in a position of leadership, both formal and informal. Most are part of the School Improvement Committee, a group of teacher leaders, specialists, and administrators who articulate the vision for the school in the form of an annual School Improvement Plan. The only CTIPs in this study who were not on the School Improvement Committee were the two CTIPs who did not work full-time at the school and found it difficult to make the meetings, and the one CTIP who was in her first year and the principal "did not want to overwhelm her." Some CTIPs have other formal positions of leadership as a part of the school's "leadership team," consisting of the team leader from each grade, the principal, the assistant principal, and specialists such as the reading specialist and the CTIP. Whereas the School Improvement Committee sets out the vision and broad goals for the school, the leadership team does the specifics of planning and leading staff development and setting staff meeting agendas.

CTIPs exercise leadership by making decisions for the school, whether it is in planning staff meetings or the distribution of new computers. Eric, an elementary school principal, trusts his CTIP with making decisions:

> Sometimes I just say Ellie, figure this out, because I trust her judgment. If she has a question about the price of something or something that I could answer, then she'll get back to me. Most times it comes to me. And if it's something that I don't feel I need to have input on, I'll roll it into Ellie's lap for her to handle.

Connie, an elementary school CTIP who works in two different schools, has a unique perspective because she is able to compare the extent of her ability to exercise leadership in two different schools. She says, "The two schools are very different, the leadership style's very different, so that makes my job very different." For example, at one school, Connie belongs to the leadership team. When the school acquired new computers, the principal asked Connie and another teacher who acts as the school "troubleshooter" to design a plan for the transition from the old to the new system. Connie reports:

> [The principal] said, you two make the plan, who's going to get the new computers, the distribution, what we're going to do with the old ones, he said I trust you just to come up with the plan. So [the troubleshooter] and I did what we're doing with the old ones in the lab, what's in the classrooms, who gets the new computers, we sat down over two days and came up with a plan, and showed it to him, and he said that looks good.

When Connie is entrusted to make decisions by the administration of the school, it sends a message that Connie is a leader:

> When [the principal] says Connie and [the troubleshooter] are doing the model, that sends a message there to everybody that he trusts us and we have a role in what goes on. At [the other school] I feel like I'm not really involved in what's going on in the school.

Connie's experience at the other school is much different. The principal there makes many decisions on her own without consulting Connie, and Connie feels like she is not able to act as a leader to the same degree as a result:

> It's interesting, at the other school I'm not at all involved in, in fact, she's the type of principal that makes a lot of decisions on her own, so it's not just me, she doesn't consult the staff necessarily when she came up with a plan, how the computers were going to be distributed. She came up with what we were going to buy, I'm not there as a consultant for her, or sounding board at all.

All CTIP participants reported being involved with the principal in decision-making to some degree, often when it involves deciding what technology to purchase or how to train staff. Since CTIPs tend to not have access to a large budget (one CTIP at a large high school has $2,500 budget, and a CTIP at a middle school reported having no budget), CTIPs must find ways to acquire technology hardware and software when needed by working with the library media specialist's budget, the principal or County's budget, or by working with teachers to develop grants.

In addition to being able to exercise leadership, many of the CTIPs in this study are looked upon as technology leaders in their schools. In a teacher survey of schools participating in V-LIT II, 80 teachers out of 103 chose a CTIP when

asked to name a technology leader in Rosemont County. Teachers listed the reasons why they chose the CTIP; these included not only the knowledge the CTIPs had about hardware and software, but also their abilities to expose the staff to innovative teaching practices using technology and their willingness to reach out and share what they know (i.e. "She is knowledgable [sic] and willing to pass on her knowledge of technology," or, "She knows a lot about the technology available to us, and uses it regulary [sic] in her classroom. She is always willing to help you with technology problems, or with ideas to use in your classroom"). A sample of responses to the question, "Why is this person a technology leader?" are listed below:

- She exposes students and teachers to innovative ways to integrate technology and learning as well as exposing us to sites she finds in her own explorations.

- She listens to teachers and students and helps them achieve their goals while bringing new and innovative concepts to them. She's humble and delivers information in a way that people can and want to absorb it. And she is brilliant in the way she connects technology to the curriculum

- They are willing to try new ways of doing things and share their experience readily.

- informs; educates; teaches; is there for support and troubleshooting; organizes county wide events and workshops; keeps on top of the latest in technology

- She is readily accessible to assist with the various units that I have created, and just been a great resource.

- She is readily available and knowledgeable about technology, but yet thinks like a teacher. She learns tools, models and shares eagerly with teachers and students in a personable manner. She is willing to give extra time and energy to everyone and seems to really enjoy sharing ideas and collaborating. She does not make me feel stupid when I don't know something.

- She keeps the staff informed about new technology, gently prods staff to include technology in their teaching, gives her time freely(well past 'contract hours') to assist or train staff, is incredibly patient when working with staff members.

- She has a wealth of knowledge and is able to convey that in a way that is easy to understand. She is very patient and is full of energy and excitement.

- First and foremost, She is great with people! Secondly, she is truly a lifelong learner and is intrigued by the impications [sic] that technology now has on education.

Teachers recognize CTIPs not only for their technical skills, but also for their innovation, curricular knowledge, and interpersonal skills.

CTIPs Relating to Teachers

The V-LIT II participants identified the ability to relate to others as one of the characteristics of technology leadership. These CTIPs are seen as leaders not only for their technology expertise, but for their abilities to focus on instruction and to relate to teachers. Of the CTIPs who participated in interviews for this

study, eight out of nine CTIPs are former classroom teachers and draw heavily upon their experience as a teacher:

> It helps having been a teacher, so I can relate to teachers, I know how busy they are, and I don't want to overwhelm them, because I can get carried away, techie people can…so I'm very sensitive to that, and I don't overwhelm teachers at all, so I can relate to them, and communicate (Connie, elementary school CTIP).

> I think you've really got to be a good teacher, and you have to think like a teacher to be a technology leader in a school anyway (Alice, elementary school CTIP).

Rosemont County made a deliberate decision to primarily hire former classroom teachers when the role of CTIP was first created. The focus was to be on teaching and learning, not on just using technology – the "C" of Curriculum Technology Integration Partner, rather than the "T". When the County recruited new CTIPs, they hired good teachers who exhibited leadership potential and the ability to talk to teachers, thinking that the technology aspect of the job could be taught more easily than the curriculum aspect. Alice spoke of the County's reasons for recruiting her to be the first CTIP at her school:

> That first year of CTIP, they did a great job with their training, and I worked really hard that year. I was very stressed because I was so aware of the technology still that I didn't know, and I knew that people would be coming for that, but I knew that it was so much more than that, and I knew that I was selected for other reasons, not really the technology, because they kept saying, we can teach that, we can show you that, and that's not the big deal, it's the ability to talk to teachers, the ability to model good teaching and all of those things, so I was very honored to even be asked.

Ann, who was Alice's principal until the summer of 2005, spoke of Alice's strength as a good teacher:

> She's very talented in curriculum, and best, in good teaching practices. She's, to my mind, about as close to a perfect teacher as you can get in terms of, not that she does everything perfectly or doesn't have problems, but her knowledge of curriculum, her knowledge of how children learn, her openness to improving herself at all times makes her just an exceptional person, an exceptional instructor. And so she came into that job knowing very, according to her, knowing not that much about technology, enough, you know, but not at what you would want to be knowing if you were somebody who was helping other people. She learned fast, she learned really fast, and she does a lot of legwork for people, and she's very good at assessing where people are on the continuum of knowledge and applications themselves, so, for instance, my first grade team is probably not as far along as other teams, and she knows how to differentiate for the adults in the building very well.

Some of the CTIPs were previously teachers at the same school where they are currently CTIPs. I asked Connie, an elementary school CTIP, if it was a difficult transition to go from a classroom teacher to suddenly being in the leadership position of a CTIP:

> Not at all, because almost from the first year I was teaching here I was lead technology teacher, web coordinator, troubleshooter, and so people always came to me anyway, and so it really wasn't that different, it was part of my job, and people really got to associate me with technology to the point where somebody would come in the room, I can't get such and such to work, I'll watch your class, if you can go solve that problem, and so when I was CTIP, it's like I'm doing what I was doing before, I just don't have the distraction of teaching kids. It was an easy transition, most people saw me as a technology person at both schools, I've just been really involved, both made it easy.

Connie also feels that being a CTIP at the same two schools where she was a teacher has been an advantage because she already has a relationship with these teachers: "I've worked at both schools so I'm really lucky that I know the principals and a lot of the staff at the other school, and because I was a teacher here, I know everybody."

One CTIP in this study is not a former teacher, and feels that this has put her at a disadvantage. Beth says:

> Not ever having been a teacher before, not having gone through an education program, I, in some ways, I find that educational leader in the building role kind of difficult, because I'm not coming from that place of experience. So when Tammy was talking about the balancing that, the CTIPs aren't administrators and they're colleagues, but they need to sometimes be the ones to direct teachers, and that's kind of a hard balance, and I find that it's really difficult for me not having that education background, and I'm going to get it at some point, but you know, that wasn't my initial interest, so it's kind of slow in coming, but I think that that's maybe a little different here and a little more difficult than it would be for someone else in my position….
>
> *Does the CTIP have a leadership role here, do you think?*
>
> They're supposed to. And that's something [the principal] says all the time, he's always reminding me how I'm supposed to be an instructional leader in the building, and I'm not really comfortable with that role, that the person who I'm here replacing had been here for thirteen years… so she'd already been here in a leadership position because just for the fact that she'd been here as a teacher so long and I think coming into the school where you haven't been before and don't have anything come and back you up as like a base knowledge other than the fact that I knew about computers, I'm still learning what they do all day in their classrooms so I think it should be a leadership role, I don't think I'm necessarily fulfilling that the way the job should ideally be done.

In other words, Beth senses that a CTIP's role is not only to provide training and support to teachers using technology, but also to function as an instructional leader, as her principal envisions the job to be. Another challenge Beth faces is lack of experience as a teacher; because she was never a classroom teacher, it is not as easy for her to relate to teachers and communicate with them, two very essential skills for leaders to have. During the two interviews I conducted with Beth, she often mentioned how difficult it was to fill the shoes of her predecessor who had been a teacher at the school for thirteen years and "who didn't have the word 'no' in her vocabulary at all, and had been the lab teacher when there used to be lab teachers, and so was really willing to do everything." Beth also had to gain credibility from other teachers at the school who had been teaching with technology for a while. Her principal, Bill, recognizes this issue:

> She was new to our school, there were already people in the building who were the 'experts' regarding technology. She was not a classroom teacher… So there were a lot of things really working against her, so it was important for me, for her, to work in slowly, develop relationships with teachers, so that they would count on her and rely on her… That wasn't an immediate transition; it took some time to build a little confidence in her and so on. And that's what I wanted to have happen, and that's exactly what's happened.

While it may not be necessary that all CTIPs must be former classroom teachers, it does mean that CTIPs without that background have special needs. Bill, her principal, has been very involved in making sure that Beth learns to

focus on the way technology can improve instruction, rather than on using technology for technology's sake:

> She wanted to order something for teachers and said this is what they want to do, and I can't remember what it was, I think it was an [LCD projector] in every classroom, and I said, 'Ok, so what would teachers use with that?' and she said, 'The Elmo,' and I can't remember what else, but we started to talk a little bit more about instruction. You know an Elmo is great, but it's really a glorified overhead projector…So as we talked more, I said, ok, but here you've got the LCD projector in the classroom, and you've got a teacher with PowerPoint slides or whatever the case might be, but you've not really changed the instructional delivery, and the teacher's still talking to the kids, the idea is that we want kids interacting, we want them working cooperatively and so I said so what is it that we can do in terms of integrating technology, is this going to help teachers to do that…That's the once piece I'm working with Beth on now, is ok so we're integrating technology but how does that alter instruction or how does that make instruction stronger.

In order to help Beth understand instruction better, he began in the fall of 2005 to invite her to accompany him on "walkthroughs" or visits to classrooms:

> Her background is not teaching, and she's been a librarian, so not having that background it makes it a little more difficult for her, so I've asked her to go on walkthroughs in the building with me to say, 'Ok, what do you see in that classroom, do you see direct instruction primarily, and how can that teacher augment instruction, and how can that teacher integrate technology?'…That's something that I want to continue to do with her, because I think it's important for her to see that bigger picture so that she can see how her role fits in and how she can help teachers.

In addition to the walkthroughs with Bill and the special guidance he has been giving her, Beth has been expanding her knowledge of classroom instruction by attending team meetings to collaborate with other teachers:

> I've never been a classroom teacher, so I guess the thing that's helped me the most is collaborative meetings, even though they're not necessarily me pushing any sort of technology ideas or issues or goals, just getting to kind of see and hear what's going on, and really I haven't gotten to do that many walkthroughs, but really spending some time in different classrooms and seeing how things are working, and then taking that and being able to use it to give suggestions and feedback to teachers has been really helpful (Beth).

Collaboration is helping Beth to relate to teachers. CTIPs have used collaborative meetings to help deal with some of the barriers to their effectiveness, such as ambiguities about the role of the CTIP among the teachers and administration in a school, and coming to the CTIP position without a teaching background.

Rosemont County CTIPs have roles that vary greatly across schools. They have an ambiguous role that is problematic when coworkers do not understand the CTIP position. CTIPs are neither administrators nor classroom teachers, but draw upon experience as former classroom teachers as well as upon a broad skillset for the multiple dimensions of the CTIP position. With their access to teachers, principals, and school division administrators, CTIPs have the potential to act as global change agents and leaders in the schools.

The Role of the Principal

The role of the principal in today's schools is a demanding one. They have the added challenges of data-driven decision making, keeping up test scores, and implementing any number of innovations. All of the principals interviewed for this study, however, value technology integration into the classroom and are prepared to be very involved with moving their schools toward that goal, despite having so many other challenges. They all voluntarily enrolled in this V-LIT II initiative because they believed that having more structured time with their CTIP would lead to greater technology integration in the classroom and thus increased student learning. Tammy Peters, Assistant Director for Best Practices in Rosemont County, compared the role of principals to "spinning plates":

> Spinning plates is one of the metaphors that we've used. Figuring out, I've got five things spinning right now, which one can I let drop. That's a critical lens that every leader has to have, everybody has to have that on at some point. And how do we filter.

I asked Pat Murphy, project director for V-LIT, about his extensive work with principals in the area of technology, and if he thought that being a principal today was harder now than it has ever been:

> Yeah, I think it is, because everything's harder. The tradeoff though is it just requires different skills… it just means that as a principal now you have access to tons more information…We weren't as educated years and years and years back to know that hey, you know, girls learn different from boys, and children learn at different levels, and even within one room, me saying the same lesson three times in a row isn't going to make the kids who didn't get it the first time get it the third time, and now we

> know better than that, so it just means it puts the burden on us to take advantage of that knowledge and use it. The scary thing is that there's so much more knowledge now with technology, there's so much more research available to all of us, there's so much more information available to all of us. So I think it just means there's more tools now, so it is harder …Years ago you built a house with a hammer and nails, and your best judgment about whether your boards were straight or not, now we've got laser levels, and technology that sets the house all up, but we still have to be the one who looks in the tool chest now and says now there's 185 tools instead of three, so it's not so much that the house is harder to build, in fact it's easier to build, but it's harder to plan to build the house the correct way… So I think it's the same with technology, it just puts the burden on principals to say it doesn't mean I have to use all 150 tools, or I have to know each of those in detail, so I have to assemble a team here that can help me sift through those and find the best of the best, and the most efficient tools and so on. I think it's harder just because the menu is bigger, so it's a more difficult, there's more stuff to choose from.

There has been an increasing focus in the literature on educational leadership of the principal as being an instructional leader as opposed to a school manager. Principals have the authority to mandate change, but in order to make the change occur, principals need to do more. Fran, a middle school principal, states, "We're comfortable with mandating change but then I'd have to provide the proper support." This support can take many forms. In Ann's case, it meant making decisions to find funding to make her CTIP a full-time position "because I couldn't see how she could possibly do the job if she's not," and giving the CTIP a space in the same room as the literacy specialist rather than in the lab to promote collaboration between the two. Other principals have worked on creating schedules to allow for collaboration, as well as holding their teachers

accountable for collaborating, which helps the CTIP to do their job. Additionally, principals can make sure the vision for technology integration is set in place and communicated to the staff, and build leadership in their staff.

Modeling

In addition to making decisions that would create supportive structures for teachers integrating technology, principals can also model the use of technology, or at least the willingness to take risks and try new things. Fran, a middle school principal, tries to model risk-taking: "As far as risk-taking goes, I would say that as a leader of the building, that's something that I'm demonstrating, and they're seeing." Gordon, a high school principal, does "advocate the use of [technology] and try to role model the use of it." While it is difficult to expect a principal to be an expert on using the latest technology in addition to all of the other demands for the job, a principal who requests that teachers use technology must be able to model a certain level of technology use. Connie, an elementary school CTIP, recalls just three or four years ago when the state introduced technology standards for instructional personnel that teachers had to show evidence of in order to have continued licensure:

> We were all worried that these administrators are going to sign off our competency in technology and they don't even know how to send an email. It was backwards. They're so much better now. So they need to be aware of all of this and they need to model it, and so when they're

> running a staff meeting and they're using SMART Board or Elmo or something it's just kind of not a big deal, they're just using the tool. And teachers I think they know that, because if somebody's telling you to use technology and they don't know how to send email, that's the wrong message.

According to The National Educational Technology Standards for Administrators (NETS-A) (ISTE, 2002), principals should "apply technology to enhance their professional practice and to increase their own productivity and that of others." If teachers are required to use it in their job, principals should do the same. The principals participating in V-LIT II all obviously possess an interest in technology, but have differing levels of expertise in using technology. On the high end of the scale, Cheryl, an elementary school principal, worked previously as a CTIP, and so has herself run many technology training workshops and put together a TV studio at the school. She has also presented at a number of technology conferences. Cheryl discusses her interest in technology:

> I personally like to stay on top of the newest technology out. Technology has always been a love of mine. My husband is an engineer, and how I got involved in technology… As an administrator I know technology is a wonderful thing, integration of technology is the way the world is moving in the 21st century.

Another principal, Fran, also had experience teaching with technology when she was a classroom user, and considers herself an early adopter of new technologies. She was an evaluator of teachers attaining National Educational

Technology Standards certification until the demands of her job as a principal became too time-consuming.

All of the principals use technology as a communication tool, dealing with volumes of email, and as a management tool to deal with the large amounts of data that today's principals must monitor. One elementary school principal, Bill, has made use of the interactive whiteboard during faculty presentations. The remaining four principals interviewed did not claim to use technology beyond the requirements of the job, which by today's standards requires email, spreadsheets, and PowerPoint. Principals are in a way forced to keep up – both Diana and Ann, two elementary school principals, used the term "forced" when describing their use of technology, though not denying that this is an important thing for them to learn. Ann says, "So they're forcing me into that, which is fine, I should be doing it." These two both still rely on the CTIP for technical support for hooking up the LCD projector before a faculty meeting for example, and mentioned struggling with file management and using a handheld computing device. All of the Rosemont County principals were issued Palm Pilots and are expected to make use of them in their job. Diana felt pressure from the County to learn new technologies:

> Right now I'm being forced to have to learn a lot of gadgets... but we're moving to having the everything on Microsoft Outlook and people are actually scheduling appointments with me sometimes by checking my calendar, and I don't have any control, and then I get this little [Palm

> Pilot], so I've got to learn how to do that better and keep up with that. So I'm being forced to do that.

While Diana believes that she is not highly proficient in using technology, she also makes an effort to attend technology training workshops at her school:

> I'm scheduled to take a SMART Board training with some of the staff here later in January. I've seen them used, but I really don't know that much about them. I probably don't know what they can do. So I'm going to be taking some of that with some of the staff here.

Just as in many professions, from the medical field to the business world, professionals have to keep up with the latest changes in their field. This does not mean that principals necessarily have to become the experts in using all of the latest technology tools, but they do have to keep up with new uses of technology for instruction and dealing with changes in learners. V-LIT project director Pat Murphy puts this as "instructional professional development, [not] necessarily tool professional development." If a principal attends a workshop, not only is the principal being trained in the instructional use of the new technology, but is also showing support for the technology. Several of the principals discussed attending workshops at their schools, despite the huge demands on their time:

> I feel like I'm learning all the time, just from the things that I have to do, like the training we did the other day with the ActiveBoard. Any kind of training that I can go to that my teachers go to, I will participate in (Bill, elementary school principal).

> I'm involved, I've asked to participate … how can we infuse the excitement about SMART Board and I can't exude that until I've had more experience with it, so that's why I want to get trained myself (Cheryl, elementary school principal).
>
> I attend, if I don't have a meeting then I do. When I taught I always went to all of it. And then I led a lot of it (Fran, middle school principal).
>
> Oh yeah, I make it a practice – I try to…I don't pretend to ever say that I think I'm going to be an expert at everything that we do in our school about the curriculum, I try to have a little bit of knowledge though, and not all of it…If we're having schoolwide staff development expectations, then I'm going to be there doing the same staff development with them (Diana, elementary school principal).

Principals use modeling of technology use to help them relate to teachers and to show that technology is valued at the school.

Expectations for Teachers' Use of Technology

In addition to modeling technology use and attending staff development workshops, some principals believe that they can also show that technology is valued by including technology in their evaluation of the teachers. Already the state of Virginia has required that all teachers attain Technology Standards for Instructional Personnel (TSIP) in order to have continuing licensure. The principal and the CTIP jointly review each teacher's portfolio when it is submitted for TSIP certification. Some principals go beyond the TSIP portfolio by asking to see their teachers use technology in the classroom. Bill requests to see

his teachers use technology in at least one lesson, and believes that this has helped with some reluctant teachers:

> I don't see technology for the sake of using technology, but I also do encourage and kind of push teachers to not be afraid to not use technology, and the fact that last year I required all teachers as part of the evaluation process I had to see a lesson in which they were using technology, I think that kind of spurred teachers on a little bit.

Even when there is no check box for technology on a teacher evaluation form, teachers may know that their principal has an expectation that technology is used in the classroom and will incorporate technology into classes when they know the principal will be evaluating them. While Bill believes that this helps push teachers into using it and may in the long run make them more comfortable with technology, there is no clear evidence here that the use of technology is sustained. Fay, a middle school CTIP, responds to my question about whether her principal, Fran, evaluates her teachers on their use of technology:

> Fran didn't, but there seem to be an expectation that teachers would use it anyways. I think the last principal did. Because now when she's going to be observing teachers they always want to do the unit with technology, and I find it so ironic because they work with me on one unit a year and that will be the unit that they want to show. And I just find it ironic because they're not doing this every day. But this is what they're portraying… The teachers obviously attach a lot of values, and see that as something that an administrator or a parent is going to be interested in.

Connie, an elementary school CTIP, also feels that there is an expectation at her school that teachers will use technology, whether or not teachers check a

technology box on the teacher evaluation. Her former principal, Cheryl, agreed: "It's not evaluated as such, but now it's almost like an expectation. And teachers are comfortable with that." Rosemont County is moving toward a new county-wide teacher evaluation format called the Teacher Performance Appraisal, where teachers will have a technology checkbox:

> Here they have a high expectation that teachers will use technology. Not just be trained, but integrate it into their classroom. New this year for everybody is TPA, Teacher Performance Appraisal, and that's one of the things they're looking at is the use of technology in the classroom, so principals are checking on that, the expectation is there. So that's nice. Very strong expectation that you will go to staff training and you will use technology (Connie, elementary school CTIP).

In a survey of teachers in schools of V-LIT II participants, respondents indicated that there was an expectation that teachers would use technology in the classroom:

Table 1: *Teacher survey results for expectations of teachers to use technology*

Question: To what degree are teachers at your school expected to use technology while teaching? (n=97)

Highly expected to use technology	48.5%
Somewhat expected to use technology	50.5%
Not expected to use technology	1.0%

A number of teachers added additional comments to this question. Several addressed the use of technology for technology's sake:

- I think the definition of technology is fairly broad, and I think there is not, fortunately, an expectation to use technology for the sake of saying you

did so. We are encouraged to incorporate technology when it will advance students' mastery.

- Technology is not a silver bullet. It is a tool. Sometimes it is useful. Some times it helps, and sometimes it slows down instruction. The expectation should be adjusted to reflect this reality.

- There is the expectation, but somethings [sic] pass for technology that shouldn't. For example, me streaming a video to my class from United Streaming on the web is no more integrating technology into the classroom than pushing the play button on a VCR.

- We definitely see that teachers are encouraged verbally to use technology, but I think that there also needs to be an emphasis on using it to encourage higher level thinking in kids. It is good that they can create a Powerpoint presentation, but if the info they use is only"knowledge" level on Bloom's taxonomy, why spend time doing it? We need better examples of what students can do while learning to use technology--like creating their own imovies, as several of our staff have done this year.

- Use of the latest "bells and whistles" is seemingly "encouraged" even at the expense of real teaching! Alas!

- I believe they are expected to use it, but there are no specifics or accountability to make sure it is followed through with.

This last point highlights the fact that merely expecting teachers to make use of technology without discussing how it is to be used or being clear about the expectation is not so helpful for teachers. Confusion about expectations can lead to frustration, as one respondent wrote:

> It depends on who you talk to. Some of the people I am accountable to insist that I use technology and others seem to feel it is fine if I don't. I would like there to be more dialogue about using technology in effective ways that enhance lessons--not merely so we can fill out a form saying that we use it.

Providing Access to Technology

Both the CTIP and the principal can play a very important role in getting teachers to use technology. This teacher survey respondent writes about the efforts of the CTIP (Fay) and the principal (Fran) in making technology integration happen:

> I think that Fay and our county have strongly tried to excite teachers about the varying ways in which they are to use technology. I think that Fay makes a concentrated effort to ignite the technological fire in our methods and hope that we "catch" onto what she has to offer. On very rare occasion, it is difficult for teachers who wish to use the same technology on the same day...(I wish I had my very own smartboard, projector and elmo!!!) The principal is also VERY available to assist with technology issues and set-up and is very complimentary at a teacher's willingness to try new technologies even if, at first, on a somewhat less effective way.

The teacher in the above statement alluded to one of the real barriers to technology integration – that of access to the technology. Access relies on the decisions that principals and CTIPs make about hardware and checkout policies. One respondent summarized this sentiment well: "I think that our teachers are highly expected to use technology, but oftentimes are not actually given the means to do so effectively." Expectation will do little if there is no access to the technology, as another teacher stated, "The use of technology is encouraged, however somewhat limited because of available resources." A number of the respondents chose this opportunity to articulate the barriers to using technology

in the classroom, a source of frustration when an expectation exists but the teacher is unable to fulfill:

- It would be more likely for teachers and students to use technology if we had the monetary support to furnish SmartBoards, projectors, laptops, and video cameras for the teachers who would use it. Not to check out when needed, but have access to in his/her classroom at all times. I do not use it as often as I'd like because it's a pain to make requests when there's so little equipment available on a continuous, day after day basis

- Some of the activities are way too difficult with a large classroom of students; time is always an issue - it is difficult to monitor and adjust when hardware breaks down

- it's really HARD to use the technology - theft is a problem and it is easier to just not use it. Most people want to, but many don't for this reason.

- we are expected to implement computer technology in our lessons; unfortunately, we have very little county support, things that don't work, stay that way too long. county needs to seriously fund tech people, and not try to do it on the cheap. tech support is a billion dollar business in this country. let's use it.

- Technology is not at our fingertips. Sometimes it's a struggle to access technology (Smart Board). We are encouraged to use technology, but many times it's a cumbersome process.

The issue of functioning and up-to-date hardware is present in the minds of many of the V-LIT II principals. While the principals all discussed the instructional uses of technology, they also spoke of technology integration in terms of what hardware they would like to see in use, as Cheryl did here:

> Well, the latest in the use of technology is the SMART Board, so I'd like to see more growth in the use of SMART Board. Some of the teachers are taking it on, I think some of the teachers, although they're really accepting of technology, I think the SMART Board, they're not really getting why and how it's going to benefit me, right now, and so I'd like to see that.

The SMART Board interactive whiteboard system was mentioned by nearly all of the V-LIT II principals in their interviews. In Rosemont County, the principals meet together on a regular basis and share ideas – this forum is an important way for principals to get new ideas about technology use in the classroom, and it was cited by many of the principals as a reason to participate in V-LIT II. Elementary school principal Diana, says, "part of doing this whole V-LIT II piece is hopefully keeping me up to date too as to what some of this should look like, what should kids be doing in the classroom in addition to what we're currently doing." CTIP Connie agrees that knowing what other schools are doing with technology is an important component of technology leadership: "First of all you have to be knowledgeable, what's out there and what other schools are doing, what works, and look at models of schools that integrate technology."

While sharing ideas about technology integration can be an important way for principals to stay informed about models of technology integration, there is a certain danger that new technology purchases may be an attempt by principals to be "keeping up with the Joneses," focusing on hardware rather than

thinking through the instructional value and what teachers really need to reach their students:

> All the principals are together for a meeting, somebody does this snazzy presentation with a new piece of technology and everybody wants it, but what they don't know is what it takes to then utilize it (Tammy Peters, County administrator).

> I really want people to use what we already have, and I think the way administrators are always sort of, not in competition with each other, but always sort of trying to figure out what other people are doing, there's this we need stuff philosophy, and the we really ought to make good use of what we already have philosophy. So I really think we should make good use of what we already have, and people don't always agree on that (Beth, elementary school CTIP).

> You've got Palm Pilots and iMacs and you've got all those things, and I think it makes it more difficult for leaders because, I don't think it's correct, but I think there's that feeling that you kind of have to keep up with all this stuff. (V-LIT Director Pat Murphy)

It appears that in the schools of the V-LIT II participants, technology integration represents a top-down model, where the ideas come from the principal and the CTIP, but rarely from the teachers: "I feel like it's more that I'm the one bringing the ideas instead of them" (Alice, elementary school CTIP). Todd Oppenheimer suggests in his book, *The Flickering Mind*, that this is a common practice: "For decades, the dominant trend in education has been to push teachers into technology regardless of their level of interest in these tools" (Oppenheimer, 2003, p. 308). I asked high school principal Gordon what the

process would be if a teacher had an idea for using technology in the classroom but needed hardware, software, or training:

> I don't think it works that way… I think the technology decisions come usually from the leadership in the building. It would be nice if there were other ideas coming from the staff, and they do occasionally come from the staff, but … I think the leader's critical to that decision question, and I think it's because teachers first off have a lot to do, and second off, may not believe that the resources are going to be provided.

Top-down decisions may lead to purchases that the CTIP or principal think have very good applications for teachers and students, but may not be used very much.

> I went to [the principal] for Brain Pop at the beginning of the year and I just said we need this desperately, we really need this, and it's not that expensive, can we get it, and I explained to her what it was, and said it's excellent, and again, I'm not sure who all's using it, I've used it but I don't know about anyone else (Debbie, elementary school CTIP).

> When you get gizmos before people really have a need to use them, or if you don't do enough training to know how to use them, then they get left unused (Fran, middle school principal).

One of the things that seems to irritate principals in this study is to see their expensive hardware not being used. Many principals discussed with regret seeing equipment not checked out. Fran stated, "I hate to see stuff that I've purchased sitting in a room. I hate to walk by a lab and see it empty." Just as Beth mentioned earlier, CTIP Debbie feels it's important to make use of what's already there: "One of the big things that [the principal] and I have been

discussing with the advent of this new library especially is how to really make the best use of the materials and the equipment that we have."

The CTIP, who works more closely with the classroom teachers, would ideally be able to inform the principal about the teachers' needs for hardware and what might be used by teachers. Again, it becomes important for CTIPs to have access to teachers, administrators, and principals.

The principal's role in technology decisions is essential in creating schools that effectively integrate technology. By evaluating teachers' use of technology in the classroom and modeling, these principals created an expectation for technology integration in the classroom. Technology decisions in the schools participating in this study were generally initiated from the top, and were often inspired by principals sharing ideas with other principals.

The CTIP-Principal Relationship and Technology Planning

It would be difficult and unnecessary for most principals to try to keep up with the most current technology innovations, but they still need to stay informed about how technology can influence student learning. The CTIP can be the person on whom the principal relies to help make decisions about technology in the building, especially because the CTIP generally has a much closer

relationship with the teachers and often spends more time in classrooms and collaborative meetings. “I feel like I’m his consultative right hand,” one CTIP, Ellie, said of her principal. V-LIT II was designed to provide more structured time for CTIPs and principals to meet together, thus all of the participants in this study possessed an interest in developing the CTIP-principal relationship. All CTIPs and principals interviewed discussed making big decisions about technology, such as new hardware purchases, as a joint process. Other decisions might be left up to the CTIP. Eric spoke earlier of his willingness to allow Ellie to make decisions, “Sometimes I just say Ellie, figure this out, because I trust her judgment.”

Meeting Frequency

These principals and CTIPs generally communicate, though with a variety of formality and frequency. The following table represents the CTIP and principal responses to the interview item asked in January 2005, “How often do you meet?”

Table 2: *Frequency of principal-CTIP meetings*

Elementary School A: Informally and almost daily
CTIP Response: We talk all the time… We meet socially after school and talk professionally… So we see each other regularly and talk regularly.
Principal Response: Oh, meet like sit like in a *meeting* meeting? Oh we probably never do that. She just comes in here and just lays it out. 'Here I am, let me tell you.'… I'd say we talk … probably every single solitary day. It's just constant.
Elementary School B: Informally and weekly
CTIP Response: We meet but it's not on a regular schedule, and it's usually when something comes up I'll pop in and let him know, and he'll pop in here, and we probably talk to each other at least weekly about what's going on.
Principal Response: We don't have regular meetings. More likely, I'll go down to the library and I'll say, "Do you have some time in your schedule that we can sit down and chat?" We usually have long conversations at least weekly, which is kind of the way I did it with [the previous CTIP].
Elementary School C: Formally every other week
CTIP Response: Every other Monday morning at 9:30, which is really nice, and more in-between. I'm able to stop in, hey, what do you think about this, and she does that too.
Principal Response: We meet officially every other week, on a Monday morning for half an hour, three quarters of an hour, whatever is needed, but we touch base pretty much every day that she's here.
Elementary School D: Informally and a few times a month
CTIP Response: You know, it's not really defined… Sort of a needs-based meetings rather than a periodical kind of thing…Probably less than a couple of times each month. Because we're such a small school, we could meet ourselves to death, but because we have these faculty meetings where a lot of the issues involve a lot of people, we just sort of hash about that.
Principal Response: We don't actually have a regular meeting time scheduled. And maybe we should. But we see each other, we talk every day… And whenever she comes in, [she] just comes in whenever she needs to...Sometimes it might be two or three

times in one week about one particular issue, and then other times it may be two or three weeks before she came back in about meeting with something.
Elementary School E: Informally and almost daily
CTIP Response: All the time. Sometimes I've seen him many times a week. Sometimes it can be varied topics. It can be about technology, about parent issues, I feel like I'm his consultative right hand.
Principal Response: We meet on the fly, probably daily, officially with different committees we probably are together two or three times a month at least. Officially. But we're probably together almost on a daily basis.
Middle School F: Informally and infrequently
CTIP Response: Well, I'm on the team leaders, so I'm part of that conversation, so every two weeks, but we don't have a set time… [The principal] and I don't specifically meet.
Principal Response: We don't meet… because now when we meet as a group, she meets with all my leaders, as a group, and that ends up being for her probably twice a month, I would guess. She comes when she's got questions... We don't meet about technology, except for a 'catch as you can' thing, and so if something crops up we meet.
High School G: Informally and several times a week
CTIP Response: We touch base several times a week, either in person or through email.
Principal Response: We probably talk via email three or four times a day. We probably meet the first week of school, the first couple of months of school we're probably meeting every day, but I would say in the last month we probably meet once or twice a week.

Frequent meetings can facilitate common understandings about technology in their school – the principal becomes informed about what teachers are doing in the classroom with technology, and the CTIP becomes informed about the principal's vision for technology and instruction at the school. In

January 2005, four CTIP-principal pairs of V-LIT II participants completed the online TAGLIT survey. This survey (included as Appendix D) generated data on the planning process, technology plans, hardware, technology policies, and community connections. In a number of cases, principals and CTIPs had differing perceptions of what was happening at their own school with technology. The 33 Likert Scale items on the TAGLIT school leader survey address the areas of the technology planning process (i.e. are stakeholders involved in the planning process, is the plan continuously improved); the technology planning document (i.e. does the plan articulate a vision, does it address infrastructure and standards); technology policies (i.e. is there equity in accessibility, is there discipline for technology-related offences); and technology-related community connections (i.e. does the school involve the community by inviting them in the decision-making process, does the school develop mutually beneficial school-business partnerships). These items are referred to as "Part A" and have revealed that CTIP-principal pairs who meet more frequently have responses that are more highly correlated; the pair who meets the least frequently had the lowest correlation. Table 3 summarizes the frequency of meeting and the correlation of responses between the CTIP and principal for the four pairs who completed the TAGLIT survey.

Table 3: *TAGLIT Part A correlation summary*

School	Frequency of meeting	TAGLIT correlation
Elementary School A	Daily	.74
Elementary School B	Weekly	.52
High School G	Weekly	.51
Middle School F	Infrequently	.17

Pairs who meet more frequently have a higher correlation on reporting the amount of technology hardware at a school. "Part B" refers to the last nine items of the survey that asked for numbers regarding the ratio of students to hardware such as computers and digital cameras.

Table 4: *TAGLIT comparisons by CTIP-principal pairs*

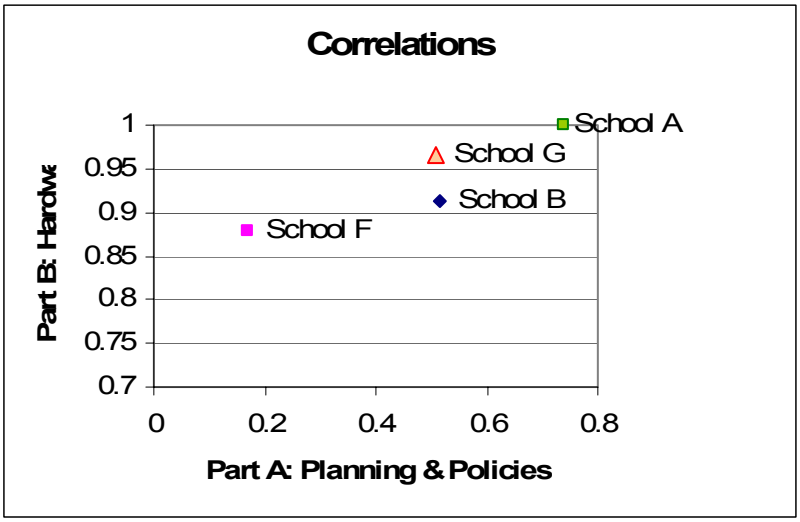
Elementary School A **CTIP & principal meet informally and almost daily**	
Part A: Planning and Policies 33 items, Likert responses range 1-4	Standard deviation: .76 Correlation: .74
Part B: Ratio of hardware to students 9 items	Standard deviation: 0 Correlation: 1
Elementary School B **CTIP & principal meet informally and weekly**	
Part A: Planning and Policies 33 items, Likert responses range 1-4	Standard deviation: .93 Correlation: .52
Part B: Ratio of hardware to students 9 items	Standard deviation: 7.2 Correlation: .91
High School G **CTIP & principal meet informally and weekly**	
Part A: Planning and Policies 33 items, Likert responses range 1-4	Standard deviation: 1.11 Correlation: .51
Part B: Ratio of hardware to students 9 items	Standard deviation: 53.68 Correlation: .96
Middle School F **CTIP & principal meet informally and infrequently**	
Part A: Planning and Policies 33 items, Likert responses range 1-4	Standard deviation: 1.78 Correlation: .17
Part B: Ratio of hardware to students 9 items	Standard deviation: 54.77 Correlation: .88

While each of the principals and CTIPs filled out the same survey, there were differing perceptions about the technology planning and policies in place at the school. As might be expected, the principal and CTIP from Elementary School A who meet on practically a daily basis had answers that were the closest together, with the smallest standard deviation of the four pairs in Part A. In fact,

there were only two out of the thirty-three Likert Scale items on their surveys on which there was a difference greater than one. These two items referred to the existence of policies regarding acceptable uses of technology by staff and discipline for technology-related offences. On these items, the CTIP believed that these policies do not exist at the school, in contrast to the principal who believes that these policies exist and are operational. The CTIP-principal pair from Elementary School A had perfectly correlated responses on the ratio of students to hardware at the school.

The CTIP-principal pair whose responses were furthest apart was from Middle School F. Here the CTIP and the principal have no regularly scheduled meetings and meet infrequently, in large part due to the CTIP working only part time at the school. While they do differ more than any of the other schools in reporting the ratio of hardware to students, it is their viewpoints on the school's planning and policies that reveal the most difference, as indicated in the following chart:

Chart 1: *Correlation between TAGLIT part A and part B*



The principal and the CTIP of Middle School F have a much lower correlation (.17) on their responses for Part A of the TAGLIT survey. This low correlation is further illustrated if we break the responses for the thirty-three items of Part A into two categories: "similar," referring to items on which their Likert Scale responses are the same or only one apart, and "different," referring to items on which the values of their responses have a difference of two or three.

Table 5: *Similar and different TAGLIT responses between CTIP-principal pairs*

School	Similar	Different
Elementary School A	31	2
Elementary School B	30	3
High School G	27	6
Middle School F	14	19

Table 5 illustrates how much more disagreement on technology plans and policies the CTIP and principal at Middle School F have than other CTIP-principal pairs at the other three schools. The items on which they disagree the most refer to continuously improving the technology plan, addressing facilities (i.e. space, power), assuring high-quality professional development, and informing the community about school technology initiatives and use. In all but the last item (informing the community), the CTIP responded with a "1" ("we don't have this policy") and the principal responded with a "4" ("we have a formal policy and it is fully operational"). Overall, the CTIP responded with a much more negative view of the school's technology policies, perhaps because of her frustrations with her lack of control over budget, such as she expressed in one interview: "I think that without having a budget I feel undermined to a certain extent…Within the bureaucracy we don't have that power."

Elementary School B, with an overall correlation of .94, and High School G, with an overall correlation of .97, fall in the middle between Elementary School A and Middle School F, with CTIP-principal pairs who have no regularly-scheduled meeting, but touch base with each other at least once a week. Aside from principals believing the number of digital cameras at the school is much higher (Elementary school B's CTIP counts them as 100 students for every one camera versus her principal's count 49:1; High School G's CTIP counts them as

238:1 versus the principal's 83:1), the CTIPs and principals generally had similar perceptions about the school's hardware availability. There were some differences regarding technology planning and policies; for High School G, this mostly occurred under the heading of "the planning document," where the principal did not agree that the document addressed articulating a vision, discussing research, describing the current situation, and defining goals and objectives. These items tend to be more on the minds of principals, since their job is to have a broad view of the school and to ensure that a vision for learning is in place. The item the Elementary School B CTIP and principal disagreed on the most was the policy for discipline for technology-related offenses. Here the CTIP indicated that there was no policy in place.

Thus, among the TAGLIT survey respondents, principals and CTIPs who meet more frequently have a more similar perception of the technology policies and planning processes than principals and CTIPs who meet infrequently. While it is likely a principal has little time to keep track of the exact numbers of hardware in a school, one could imagine that technology planning would be very difficult without a clear idea of what the school owns to begin with. This evidence would suggest that Rosemont County might be on the right track to provide more opportunities for CTIPs and principals to sit down together.

Views on Technology Planning

In the current literature on leadership, there is a general consensus that the role of vision is very important. An effective educational leader sets a vision, or at least ensures that a vision is in place, and promotes the carrying out of that vision in the form of a plan. In regards to technology, leaders are

> …expected to first and foremost be able to establish and articulate a vision for technology, and a plan for carrying out that vision in the form of a school technology plan, for which they have to gain budgetary support while working with other district staff and administration to promote the shared vision. (Frasier & Bailey, 2004, p. 5)

Despite the explicitness of this viewpoint in much of the prevalent literature, there is a variety of opinions among the V-LIT II participants about technology plans. Some schools have technology plans, some have a plan that is integrated into the school improvement plan, and some have no plan, and the opinions vary as to whether a plan is even necessary.

When asked, "Does your school have a technology plan?" in January 2005, V-LIT II participants responded as indicated in the table below:

Table 6: *Interview responses for school technology plans*

Elementary School A
CTIP Response: Not one that's specific [to this school]. We use the County's. I've been at a school where we've had our own years ago. But it seems to be fine. This school has been under transition. I've been here four years now but it's changed, the whole population, so what I'm saying is there's been so many other issues to deal with that that wasn't that important, the County had something that worked.

Principal Response: I don't think that's, well, we could have a plan I guess, but sometimes that's counterproductive because it's like with the instructional plan that's going on now, it's called the Framework for Quality Learning. It's a division initiative and for me to do something different would put two big things on the plate for all of us to do, and I've learned the hard way. It's kind of best to find out what my expectations from the County are before I go around doing something that's different.
Elementary School B
CTIP Response: Written official plan? Not that I know of, not beyond the County's technology policies. I haven't read the school improvement plan in a while but it's not an integral part of that. It comes up, but there's not a separate technology plan that I know of.
Principal Response: A technology plan. We used to. Currently, no. I guess what the other schools had as a technology plan is basically what each grade level would cover in terms of technology standards.
Elementary School C
CTIP Response: Well the district has a plan, like so many computers per student ratio and they have their curricular instruction too, that's more of our focus than actually the technology part. Which is the way it is [here]. I would say the Design 2004 initiative has really shaped a lot of our professional development and as far as technology, no, we don't have a like teachers will use it for this specifically kind of thing, it's more just part of our life.
Principal Response: Yes there is, it's part of our school improvement plan, the Design 2005 component of it, and we met at the beginning of the year and constantly have faculty meetings talking about technology which ways we're moving forward at the beginning of this year. We had conversations and actually used an Inspiration document and the teachers met and talked about if the budget was totally available, what would their wish list be, so we actually were having a conversation about where we want to move in the next 5 years, and now we're using that to kind of put a plan together.
Elementary School D
CTIP Response: Yes…I believe that was in place before I became the CTIP, yeah, definitely, because I didn't have any input, I don't think, into that as far as I can remember.

…I believe it's discussed at the beginning of the year, I think it's included in our handbook at the beginning, that we go over. Other than that it's just kind of…we know it. We just know what it is. But things change so much too, because just like the new library addition, we've had to meet with the County technology people about what we're supposed to be getting for that, and it seems to change every now and then.
Principal Response: I would say that we're using the technology plan for the County, but I'd like to see us have our own kind of plan. And that would be something that we'd need to work on, but no, we don't have anything that says by June, by April, by May… It's part of our part 3 of our school improvement plan, and it actually is to address that particular area, is to say, what is it that we would need to do what's the planning that would take place that puts us in that place that we need to be. And there's probably about half of the staff who's really good and knowing what they need to do, and there's half of the staff who probably stay away from some of the things other than just using the lab or some kind of software but they're not necessarily using it to enhance instruction.
Elementary School E
CTIP Response: An individual plan? It's part of the regular plan. I think that [the principal] and I could articulate a plan, but we don't have it in a little book. I have a plan in my head where I think I'd like to see things go.
Principal Response: It's not part of the school improvement plan. There has been a technology plan, frankly I haven't looked at it for a long time. I think the last time we had that out was maybe a couple of years ago. We've kind of been on auto pilot because we had a grant that kind of took care of our technology needs and our training and all that a couple of years ago … that was basically our technology plan for the last couple of years.
Middle School F
CTIP Response: The school doesn't have a technology budget. That's at the County level. So the technology plan, it's actually getting frustrating, we don't really have one because that's at the County level. So they have this whole plan about when they're going to update schools. So again, that connection between having the resources. There's within the bureaucracy we don't have that power.
Principal Response: Well we certainly have had one. We met this fall with the County technology people because all of a sudden, I don't know, 5, 10, whatever number of

computers were delivered to our building. And it wasn't part of, our plan that we had created with them, so we didn't understand it. Now if you mean a technology plan for bringing in materials, that's what I'm speaking of.
High School G
CTIP Response: No…we have 3 goals for school improvement, and the third goal is related to technology
Principal Response: The County has a plan. The division has a plan.

Many of the respondents indicated that they did not have their own plan because the County had one. This may indicate a certain level of trust in the County; it may indicate lack that little value is attached to a school's own technology plan; it may indicate too many other priorities to be able to gather people together to write the plan; it may be confusion over what exactly a technology plan is (hardware distribution? learning standards? teaching strategies? professional development?). It may also be a combination of these reasons. Responses varied greatly among the respondents, and even within schools. The responses indicated above in Table 6 can be roughly broken down into the following categories:

- "Our school technology plan is incorporated into our School Improvement Plan."
- "Our school has its own technology plan for hardware distribution."
- "Our school looks to the County for how to incorporate technology into instruction."

- "Our school uses the County's technology plan for hardware distribution."
- "We don't have a plan."

There seems little agreement on technology plans among these seven schools, and even within schools. For example, in Middle School F, there is disagreement as to whether the school follows the County's or its own technology plan. This difference of opinion is consistent with the results from the TAGLIT survey, discussed earlier. The TAGLIT survey indicated that there was a low correlation (.17) of responses on perceptions of technology planning and policies in place at the school. Meanwhile, Elementary School A, consistent with its correlation of .74 on the TAGLIT planning and policies items, has a closer idea of what technology plan the school is following.

I followed up in December with the question of "Do you think a technology plan is necessary?" and again received a variety of responses, as indicated in Table 7:

Table 7: *Interview responses for necessity of a technology plan*

	Yes	No
Elementary School A CTIP		●
Elementary School A principal		●
Elementary School B CTIP		●
Elementary School B principal	●	
Elementary School C CTIP		●
Elementary School C principal	●	
Elementary School D CTIP	●	
Elementary School D principal	●	
Elementary School E CTIP		●
Elementary School E principal		●
Middle School F CTIP	●	
Middle School F principal	Undecided	
High School G CTIP	●	
High School G principal		●
Total	**6**	**7**

The V-LIT II principals and CTIPs are almost evenly split on whether a technology plan is necessary. Many CTIPs and principals discussed making decisions about technology hardware, software, training, and support not in accordance with a plan, but rather because they felt they intuitively had a vision and together could make decisions, as the CTIP and principal from Elementary School E: "I have a plan in my head where I think I'd like to see things go" and, "We've kind of been on auto pilot." Gary, a high school CTIP, says, "I think we don't necessarily have a firm plan on how things are going to work exactly, it's just sort of like let's see what happens." A number of interviewees talked about

using the County's technology plan rather than having their own technology plan. Connie, an elementary school CTIP, discusses how she does not see a need for a technology plan:

> We really don't see technology as something separate. We really don't. It's kind of odd to think of a technology plan. And I used to work in schools where we had a technology plan, a site improvement plan, and they were two separate things, but here the technology plan really is seamless… The County has been implementing that FQL, and we tied a lot of technology into that. Really here, we use technology for everything. It's just part of things. …When we talk about lesson plans and curriculum, we use technology, model it, but it's not a separate issue. It really isn't. The things that we really have to concentrate on as a separate issue, are staff training, and we just got all new computers throughout the school… It's very integrated. It's just part of TPA, it's part of the Framework for Quality Learning, we've been doing a lot of DuFour training, it's just all woven into that.

Rosemont County has made an effort to tie their initiatives together so that they are seen in exactly the way that Connie does, as integrated and "just part of things." Rosemont County administrator Tammy Peters believes that technology is integrated within the Framework for Quality Learning initiative: "There's no way that our teachers could 'teach' the Framework for Quality Learning without having tremendous access to technology, tremendous facility with technology, and a vision for how technology can engage students and increase learning."

Two other principals agree that a technology plan is not necessary; Ann believes that technology planning is important to address somehow, but it is better integrated into the School Improvement Plan:

> We don't have an individual school plan, but what we did is fold technology into all parts of the School Improvement Plan, so it's not like you're having a plan which is just a technology plan, which I think probably tends to focus you too much on technology for its own sake.

Eric believes that the County plan, namely for hardware and software distribution, has become sufficient for their school's needs, as technology has become more integrated into what they do:

> We have the grace of the school division to guide us as far as the ratios of computers to children and some of the software we're to use. A long time ago, eight years ago we had plans, and they were really important because that's how we operated the school in terms of building this technology base and use of technology…I don't feel like we necessarily need a real specific plan, because it's part of what we do. It's like little kids, you want to give them a list of their chores that they have to do, and that's their plan, but if they are doing those chores and it's working, then you may not need a plan, you may need to have some conversation about what the future looks like or what some goals might be and I guess that could be a piece of a plan, but our work here is informal in that regard, we move where the needs are, but I think there's enough in place that the school division's plan is probably sufficient.

I asked V-LIT project director Pat Murphy, who has seen many technology plans, about whether he thinks it's even necessary for schools to have their own individual technology plans if the County is able to tie technology into a larger initiative:

> I think it depends on whether they can legitimately and competently say that technology is being addressed in a bigger plan or not… I hope I wouldn't be so overly confident that I would just say the district has a plan so I don't need one. Not to say that their school plan may not just be absolutely brilliant, but I would hope that they're so closely connected to the district technology plan that they really do know what's in it, and they're aware of what's being implemented. I'm not sure that that's the case all the time. … If you go to a school and they say we do have a school plan, we have a health and safety plan, and we have a so-and-so plan, but we don't have a technology plan because we know that the central office has one, the jaded side of me would say that's a red flag, that says I don't value it enough to think that it deserves its own place in this plan. But the optimistic side would be maybe that person really is so closely connected, they understand the inner workings of it, that a good relationship with the technology-related staff, that they feel so confident that their relationship means I don't have to have a whole separate document to do this. The technology leaders that I've seen that I think have good plans, and I've looked at a lot of technology-related plans or school improvement plans, to me the best ones really are the school improvement plan that incorporates all of these things in an interwoven picture. …where the principal's heavily involved, and parents were heavily involved, and it really wasn't a document, it was a vision that has steps to get to the vision, and it incorporated technology, and it incorporated differentiated instruction, and gifted instruction, and professional development, you know it was a road map to the vision basically.

Pat reminds us that an important part of leadership is vision, and school plans are steps to get to that vision. After all, without outlining steps to achieve a vision, how will a school know if it has reached its goals? The International Society for Technology in Education (2002) states that it is important to develop a local vision for technology, unique to the culture of each school and driven by the school's vision for instruction. The co-creation of a plan by administrators, teachers, parents, and CTIPs who have first-hand knowledge of what is working

or not working at the school already with technology is necessary in order for members of the school community to sense ownership and understand the shared vision. It is this understanding of the vision that is essential for distributed leadership, so that members of an organization are able to act without checking constantly with supervisors for assurance about decisions that need to be made; instead they can ask if a particular action is consistent with the vision plan.

Rosemont County administrator Tammy Peters explains how it is important for a principal to have a clear vision for what technology can do to improve student learning in their building:

> If my choice is to support every teacher having a webpage, and I don't have a clear vision for what that webpage should do to improve student learning, but that's what we're going to do, that's my goal to the superintendent, and the end of the year I'm going to be able to say I met that goal. And what I ultimately do is pull my CTIP from planning Framework units with teachers in order to make that happen, then I've just brought Peter to pay Paul when I'm not so sure Paul's what I really want to pay for anyway. So it's the leader that has a clear vision for learning and can evaluate and plan towards set up structures so that technology can support that vision. But it's got to be about learning. It's got to be about learning and the role that technology could play in that. It's not just about having the greatest stuff, or the highest numbers, it's about how we are leveraging everything possible to give kids every possible shot at learning what they need to learn.

What these interviewees appear to be saying is that it may not necessarily be a problem if the school does not have a specific technology plan as long as the

principal has a clear vision for educational technology in the building and that vision has been communicated to the members of the school's community. In a survey of teachers from these V-LIT II participants' schools, I asked about the existence of a technology plan and what the vision for technology integration is at the school. The results of the 90 teachers from six schools who responded to the question "Does your school have a technology plan?" indicate that 64.4% of teachers responded "yes," 3.3% responded no, and 32.2% responded "unsure." When asked what the vision guiding the technology plan is, nearly all respondents wrote that it was to enhance student learning and to prepare students for a future that requires a certain level of technology skill, such as this typical response: "Technology will help instruct to a greater depth and to a deeper understanding. Technology is a tool to help our kids learn and succeed in the future," or simply, "Use more of it during instruction." Some teachers added that it was to be used as a management tool as well: "My understanding is that we need to be current in our use of technology for both communication, data management and instruction. That sounds like a fine plan to me." It is unclear from a brief online teacher survey whether teachers can articulate the school's vision beyond these statements.

One of the elementary school principals interviewed, Bill, feels that even though his school (Elementary School B) currently does not have a technology

plan, it is important to have a written plan. He and his CTIP, Beth, had been making all of the technology decisions on their own, but are planning to create a technology committee in January, 2006. Beth spoke to me in December about why they decided to create this committee:

> I think the problem is that we need to have some idea of where you're going and what your priorities are, and I think that right now for the past year or so anyway it's been Bill and I deciding, I say, 'Well you know I think we should get this because it's a good idea,' but it can be my good idea and I can think it's great, but if the teachers aren't willing to take on some new piece of equipment or some new idea, but it doesn't matter what I think, so we may not need a written plan, but there has to be some sort of structure for figuring out what people want and what they're willing to do.

Beth is aware that teachers need to have a voice in technology planning. While the principal can set the broad vision for learning at the school and the CTIP can help find the middle ground between the principal's vision and the teacher's use of technology, the input of teachers is necessary in order for there to be buy-in from the teaching staff. Beth recognizes this has been a problem as she has been trying to get teachers to create their own webpages:

> One of the problems I'm having right now with our website is people see it as my thing and not something they have any investment in, and the new structure we have for our website is that every teacher can have their own page, and nobody really understands why that would be that important or why they would want to have their own page, and so far it's just been me telling them that it's a good idea, and that's not going to get anybody to add something else to their already very full plate.

I asked Bill if he thinks it's important for a school to have a written technology plan:

> I think it is, and that's why we are going to have a technology committee. So we're going to develop that, and look at trying to develop our own plan, and the first part of that is doing a needs assessment, where are we in terms of training, where are we in terms of equipment, what do we need, and go from there…. I think every school has different needs. Our school is not going to look like Ross Elementary school, and it's not going to look like Robertson Elementary School, our demographics are different, our size is different, and so I think we need to look at what are the needs of our staff, and go from there. You're all getting at the same goal, higher student achievement, but you may need different things in getting there.

Bill sees that each school is different and a "one-size-fits-all" approach of simply following a County plan at his school may result in not thinking about a plan at all. Bill would like to sit down with some of the County administrators to think through the process of creating a technology plan and to serve as a "sounding board" for that process. He told me about what might be in the plan:

> I think we have to talk about equipment. I think we have to talk about where teachers are in using the equipment that we currently have, and what we would need. But I think part of that conversation needs to be where do we see ourselves as a school, so … what I'd like to see instructionally in the building needs to be part of that conversation, so what is it that we need to do, and where to get to that place.

It is not just the document itself that is important, but the process of having a conversation about how the technology should be used in the school that is also valuable. Without the process of creating a technology plan, it seems unlikely that this conversation would take place, and any decisions that need to

be made about technology may focus solely on hardware distribution. Diana, an elementary school principal, speaks of her school's recent experience with going through the same process that Bill is attempting; over the summer a newly-created technology committee crafted a technology plan and shared it out with the rest of the faculty at the beginning of the school year:

> I think it's important for teachers to have something in writing, it can change, but it's really about the process of writing down what is our beliefs, what are we committed to, so that it makes it somehow more real than just talking about it. Otherwise what happens is you get into just the nuts and bolts. A perfect example, we got some new hardware coming to our school finally and the conversation automatically can shift into how many, who's getting what, dividing it up, instead of it being about what do we want to do with it, where do we want to have access to it, what makes that work for the whole purpose.

As the principal of the school, Bill sets the broad vision for instruction in the school in accordance with the County's initiatives. I asked Bill if he had a vision for technology in his school:

> For me it's a broader vision, and technology's a part of it. I would like to see in our building, I would like to see students working more cooperatively, I would like to see students working at higher levels of Bloom's, I would like to see students having more opportunity to take ownership of their own learning, and I think technology plays a part in that. The idea for example of stations in the classroom, is not something that I typically see, but something that I think we should be doing more on than what we're currently doing. And I think obviously technology's a part of that where a group of kids are on laptops, another group of kids doing something else, so again I don't see technology for the sake of using technology, but I also do encourage and kind of push teachers to not be afraid to not use technology, and the fact that last year I required all teachers as part of the evaluation process I had to see a lesson in which

they were using technology, I think that kind of spurred teachers on a little bit.

The role of the principal here is in accordance with the literature and with experts like Pat Murphy and Tammy Peters. Bill is setting the broad vision for instruction in his building, and relying on the CTIP and teacher leaders to help plan the steps to get to that vision. He is also going to work with County administrators to make sure that his technology plan is in accordance with the County's plan. These actions bring together distributed leadership, trust, vision, planning, integration of initiatives, and leading in a culture of change, all of which have been themes throughout this study.

The literature on leadership and school change highlights the importance of planning and communicating a vision as a quality of leadership, but principals and CTIPs participating in this study have varied opinions regarding technology planning. CTIPs and principals who meet frequently are more likely to have similar perceptions of technology planning and policies in place at their school than CTIPs and principals who meet infrequently.

V-LIT II

The goals of the V-LIT II project were broadly to build technology leadership in Rosemont County, and specifically to develop the leadership of the

CTIPs and provide structured opportunities to nurture the relationship between the principal and the CTIP. The events for 2005 were to include:

- Participation in three project meetings
- Development and execution of a collaborative professional growth plan aligned with TAGLIT results, NETS-A and some artifact (School Improvement Plan, Teacher Performance Appraisal rubrics, School Board/Superintendent Priorities, etc.) of work currently in progress at the school
- Attendance at the National Educational Computing Conference
- Attendance and presentation at the Virginia Department of Education Educational Technology Leadership Conference
- Attendance hosting up to three site visits as requested by project coordinators

In January of 2005, Tammy Peters and Tom Byers, Coordinator for Instructional Technology for Rosemont County, met with the seven principals and seven CTIPs who had responded positively to an email that was sent out to determine interest in participation; all seven CTIPs and principals elected to participate. I met with each of the V-LIT II participants, and asked them why they wanted to be a part of V-LIT II despite busy schedules. Many of them

commented that despite scant knowledge of the details of V-LIT II, they were interested for many of the reasons summarized by one principal, Bill:

> I guess initially I was thinking that it would provide for me more resources, more information and as a result help me with my staff. When we did the V-LIT I, there was some training for administrators which I thought was helpful but wanted to continue and so I just felt like this would be a continuation.

Bill's desire to build upon his experience with V-LIT I was echoed among other principals. This was one reason Rosemont County decided to pursue a V-LIT II initiative; the other reason was that in working with the CTIPs, County administrators Tom and Tammy were hearing the "frustrations about time to interact with the principal" (Tammy). Many of the participants found the opportunity to develop the principal-CTIP relationship to be a good selling point for V-LIT II, as elementary school principal Eric did:

> Well, because I think that we have room to grow, I think we have everything in place to make that a nice working relationship, but I think that having a purpose and an opportunity to kind of have some guidelines on working together, have some time with others …would be really helpful.

Several principals commented that this would enhance their own professional development, and others wanted to participate in a show of support for their CTIP. A number of participants expected that this would be a good

opportunity for technology planning together. One CTIP pointed out how V-LIT II would be a good opportunity to model collaboration for her teachers:

> I would hope that the project and that kind of collaboration would really extend to the teachers here. I think the teachers here really do well when they kind of see something happening, and then they can kind of model that, rather than edicts coming down from on high, this is how we're doing it and this is what we're doing (Beth, elementary school CTIP).

Two principals were interested in participating simply because the project was brought to them by Tammy Peters: "I just have such admiration and respect for Tammy, I figure if Tammy tells me I'd do it, I probably just ought to do it" (Ann, elementary school principal).

The first event of the V-LIT II project was to be the TAGLIT survey, conducted school-wide in February and March of 2005. While some principals and CTIPs filled out the school leader portion, only one of the schools completed the survey school-wide. This limited participation in the survey reflected the lack of attention administrators and CTIPs paid to the survey, and some confusion over who was supposed to take what portions of the survey. A few months later, Rosemont County began shifting many of its administrative personnel; Tammy and Tom's jobs were redefined and they had to cover extra responsibilities as well. Tammy found that to be "really tough and really frustrating, and honestly and truly one of the things that's still sitting in that limbo place between the two of us is V-LIT."

Tammy and Bill were not the only ones whose jobs shifted; during the summer of 2005, one CTIP moved out of the area, two principals moved to new schools within the County, and one principal moved to an administrative job with the County. It became difficult for Tammy and Tom to keep track of who was participating in V-LIT II, especially when the initiative was designed to nurture the principal-CTIP relationship:

> Along comes June, and the principals shuffle. So we had folks, CTIPs that didn't know anything about it but their new principal committed to it, so that was not a good design. It needs to be academic year. And for if nothing else to make sure that the principal and CTIP are stable, that they're the same people (Tammy, administrator).

The National Educational Computing Conference (NECC) took place in Philadelphia in July, 2005. As part of the V-LIT II funding, all of the project participants were invited to attend; six CTIPs and five principals attended. The two principals who did not attend expressed regret that they were unable to go and would have liked to have attended ("I know, it's crazy. I should have done it. I heard it was really good." (Bill elementary school principal)). The V-LIT II participants met for the first time as a group in June, 2005 to plan out some of the logistics of the conference, and again after the conference for a debriefing. The CTIPs and principals who participated all spoke of a positive experience there, mostly from going to good sessions at a national conference, but a few also spoke about the opportunity to interact with the other V-LIT II participants:

> I would say just the exposure itself to so much was wonderful to me. But also being with the other people that I went with from the County, CTIPs and administrators. It was a great experience. We had time to talk. We had time to talk outside of the building and about what we do and it was just a great opportunity to network in a more relaxed setting. I just think you need that, it's not about ok, I have a meeting today, in Rosemont County, it's from 1:00 to 3:00, instead it was just very informal but you still got to know people. And for the DOE [conference] I'm going to be sharing a room with Connie, and because we got to know each other on this trip, we didn't know each other at all, and I got some really good ideas from her, and so I feel now that I can reach out to people a bit easier because I've gotten to know them a little better (Debbie, elementary school CTIP).

Debbie here notes one of the real benefits of attending a conference – not only was this an opportunity to attend a national conference and acquire some good ideas for use back at the school, but also to spend time together as a group. Fay, a middle school CTIP, carpooled with her principal to the conference and had time to talk:

> We drove together, so it was a great time to talk specifically about technology integration here at [the school] and the conference was fabulous, good conversation, and it was great because as CTIPs we don't meet as a group with principals, and that was really important, and at every CTIP meeting I'm like I think we need to also have principals present, so that was great conversations every night, a mixture of CTIPs sitting with principals from different schools. So that was very rich. And then the conference itself was great, I brought back a lot of ideas, some that I've implemented.

Fay's principal expressed the same sentiment:

> If the purpose was to get the principals and CTIP folks to develop a relationship, there's no question it helped Fay and me. I think we had mutual respect for each other, we respected each other anyway prior to the conference, but there's nothing like getting away for four or five days without your family, without your friends, outside in another city to just

> talk about how we can incorporate technology into the building so I think just even the time, and on top of that going to a conference where there's a lot of really cool stuff, was helpful. So if that's the purpose, and the conference was supposed to support that purpose, then yes, those occurred.

Fay (as noted earlier) is a part-time CTIP and meets with Fran infrequently. The TAGLIT survey, completed five months before the conference, revealed that Fay and Fran have differing opinions regarding the technology policies and plans are in place in the school. This pair could potentially benefit from more time together.

After the follow-up meeting in August 2005, there were no V-LIT II events until a January 2006 meeting. CTIPs and principals reported feeling "out of the loop," and wondered if they had been missing meetings or events, with comments like the CTIP, Ellie, "I feel quite distant". Gary, a high school CTIP, still believed in the potential of V-LIT II and saw a major flaw as being failure to plan for the changes:

> I liked the concept of it, I feel like it somewhat fell apart with the changing of the guard, but I think the concept of it is good. I think that if there were a plan in place that when administration changed what would we do, that would be a good idea. That would help the new administrator transition to the role and they would really see that wow they're taking technology seriously here.

One CTIP, Alice, talked about her confusion:

> I was very confused on what to do, though. It was not clear, and I'm still not sure, when I committed to this it was because [the principal] said sure,

> and I said yeah, and just didn't know what we were supposed to end up doing. I understand the relationship thing, I understand the conversations and all that, but I guess I was looking for a definitive end product or goal. And at one time I felt like we were all going to have to present at DOE.

Alice is not mistaken; one of the original goals of V-LIT II was for principals and CTIPs to jointly create a presentation that would be delivered at a conference, such as the Virginia Department of Education Educational Leadership conference in December, 2005. This project deliverable did not occur, though there was discussion at the January, 2005 meeting of still having a conference presentation as a goal, or possibly the co-authoring of a journal article.

At the January 2006 V-LIT II meeting, there was a general discussion regarding how the project could be structured more effectively and its value in general. The principals expressed the need for a forum to help them remain current with technology. Diana, an elementary principal, said, "Technology's changing so incredibly fast all the time, just having this forum or this ability to be able to be together is really helpful because I think for me sometimes I think its about knowing even what's possible to do." The daily demands of leading a school can make it difficult for a principal to maintain perspective regarding practice in other buildings. While NECC offered an opportunity to do this to an extent, participants typically left their conference bag closed and sitting in a drawer. Consequently they reported that they had not had time to implement

any of the ideas from the conference. This group of principals, several of whom identified themselves as task-oriented, discussed methods of making each CTIP and principal team more accountable. One principal suggested meeting at the conference to develop a plan for implementation upon return. Others expressed the desire for ongoing dialog, so that the experience of the conference would not be left behind. Tammy summed it up saying, "What I'm hearing so far is that the conference is great, but we need some shorter versions of accountability."

The group expressed interest in identifying ways to use technology to promote higher order thinking skills. This has been a recent focus among the principals of Rosemont County. CTIP Beth commented, "I think that's a distinction that some people have a hard time making, they have computers in front of them so they're using technology to help them learn, and sometimes it's just kind of in front of them." Others noted that compliant students sitting in front of a computer are not necessarily engaged in learning. They suggested that ways in which NETS-A and higher order thinking skills can be linked should be explored in a future meeting.

Some of the project deliverables outlined in the original *Memorandum of Understanding* failed to materialize in part because of distractions associated with the job transitions in the summer of 2005. Nevertheless, many of the participants reported positive experiences with the summer conference and associated

meetings. The participants have expectations that the group will continue to meet and collaborate on developing technology leadership in Rosemont County.

Distributed Leadership

During the summer of 2005, a number of personnel changes in V-LIT II schools provided an opportunity to examine the school division's approach to sustaining an initiative despite these changes. Distributed leadership emerged as a key strategy to keep the County's vision for technology integration alive. Distributed leadership is created when leaders actively build leadership in other people around them and surround themselves with the people they need to rely on. V-LIT Project Director Pat Murphy explains how he thinks distributed leadership is important in today's schools:

> You'd never expect a principal to be the technology expert in the building, but you would expect that they have the skills and the knowledge and the vision to look across the team and recognize, ok, I don't have somebody who sort of stands above the crowd in the area of physics, and I need somebody like that, I don't have somebody who can kind of be my sounding board for technology and I need somebody like that, and so you sort of build your team based on your own strengths, but then also your own, recognizing your own areas that you're not strong in. … I have to look across the team members and figure out here's what I bring to the table, here's what you bring to the table, I'm going to give you an elevated role as far as technology goes, and it's different from the person sitting next to you who has an elevated role as far as classroom management goes… or whatever the topic is. So I think it just means I'm going to bring you as an expert in your field to sort of take on the elevated role, it doesn't

> mean I'm handing the baton off to you, I'm letting go if it, but it just means we're going to share this, I've got an elevated role for the whole building, and I've got to move the whole thing forward, but I need you and you and you and you to huddle with me a little bit and decide where we're all going to go.

Building Leadership in Others

It may be possible to create the team that Pat describes by hiring people to fulfill the role of expert that is needed, but if other school districts are similar to the way Rosemont County was in 2005, it is often the principals who move in and out of a school more frequently. Principals can build leadership in their teachers. Elementary school principal Diana discusses how her CTIP (Debbie) grew into the role of a leader at the school:

> I believe that that's how people grow, I mean that you kind of have to grow leaders into that, and so I talked to [Debbie] for a long time about what would the expectations be, and she more than filled my expectations, and one of the really good things that needs to be said is that a year later it wasn't what I said about her role, it was what the rest of the staff said, we had a meeting about what was different, or what was working for you this year, and one of the things that the teachers said was Debbie and her role, and the fact that she is taking that lead and pushing her way in to those kinds of meetings with regular classroom teachers. So I definitely think of her as one of my leadership team folks, counting on her to sort of lead.

Not only has Diana helped Debbie grow into a leader, but Diana has also created leaders among her teachers by "tapping into" people she believes have potential to grow and to then use their own leadership skills to relate to and

communicate with other teachers. She discusses selecting members of her staff to attend a SMART Board training:

> And I just tapped five or six people, and said I want you to go to this. And whenever you come back they can share out some of the things, and I picked those people deliberately because I know they will use it, I know they will turn around and implement it, I know they'll actually work with Debbie, I know they'll develop some kind of unit together, and in a couple of very short weeks, they'll be able to share out with the rest of the staff how that's being used, and then those will be the staff members that other teachers will go to, then whenever they want help with how to do something like that too. You always tap people every now and then.

Principals can also make sure that staff who are in leadership positions focus on instructional leadership, rather than management. Ann became principal at an elementary school where there was a structure for leadership, but it had not been used for focusing on learning:

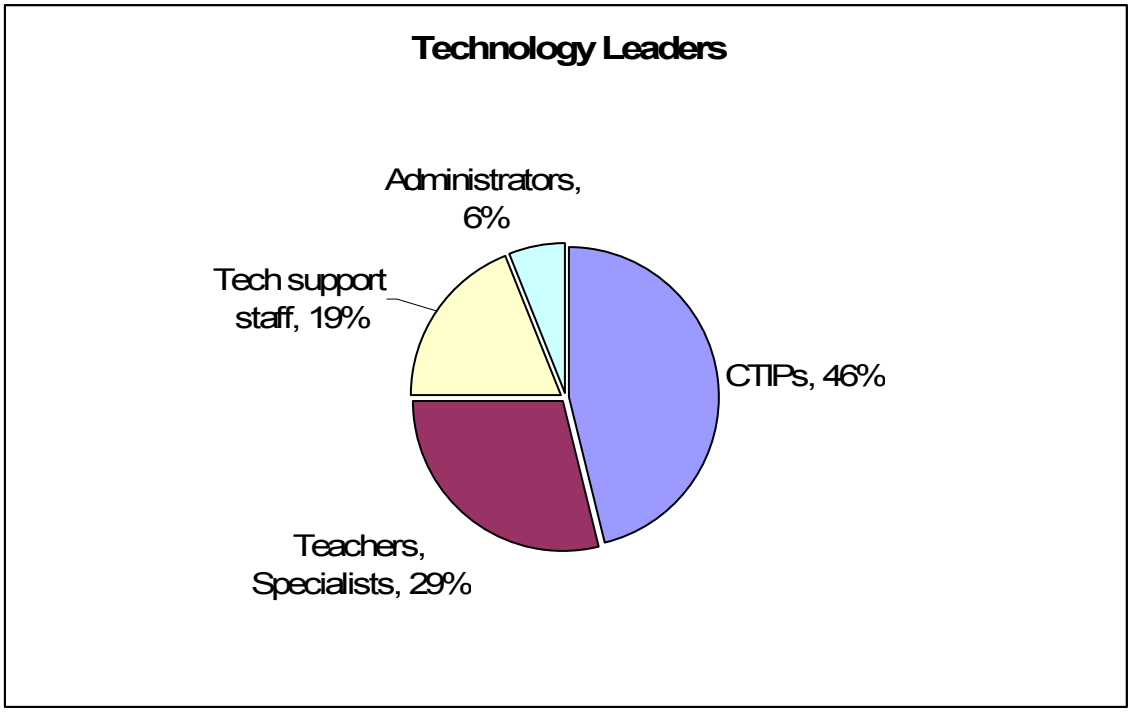
> I've used the team leaders in a very different way than they've ever been used before…. Basically what they did last year is that they operated in an old model of team leaders. … They had been used as they have been used very much in the past, as kind of the conduit between the principal and the greater mass of the classroom teachers in the building, so if the teacher had an issue they took it to their team leader and the team leader met with the principal once a month and they hashed out issue stuff. What I've done is I've taken them and I've said all that nuts and bolts issue kind of stuff that you normally either have at a faculty meeting or at a meeting such as the team leaders and principal, I said it's all going in email, anyone can ask me any question about issues they want. … This group, this is going to be a study group about instructional leadership, and so we're studying Schmoker, who wrote a book on results and data-driven stuff, so we're using that as kind of a guide for learning about how to be instructional leaders. And how to refocus from taking our focus off the teaching and refocusing it on learning. What are the children learning? And the CTIP is part of that group.

Not only principals, but also CTIPs can build leadership in others. Alice, for example, tries to build leadership in her teachers by asking them to present at conferences with her:

> I'm also the one that works behind the scenes to make someone else look good, whenever possible, and that's the scaffolding that I think a leader has to do to make other people rise….Within the past year I've presented twice [at conferences], and …I've brought a classroom teacher and stepped them up to the plate. [One person I presented]with, he's now an administrator, but he knew that he needed to do stuff like this, and I knew that he did too, and we also worked together fairly well, and had done a lot of things together, and so I said to him, 'Will you present with me?' and so that's just what we need to do more of, that's the kind of thing you just step up other people.

In a survey conducted at the schools of the V-LIT II participants, teachers were asked to identify up to two technology leaders in Rosemont County. The 114 respondents identified CTIPs, classroom teachers and specialists (such as the gifted teacher or literacy specialist) who use technology with students, administrators, and technology support staff.

Chart 2: *Teacher survey results for identification of technology leaders*



This chart indicates that 29% of teachers and specialists who work with students are seen as technology leaders, more than technology support staff whose jobs are built on technology expertise, and administrators, whose jobs are built on leadership. In these schools, teachers envision technology leadership as a quality that applies more to teachers, specialists such as CTIPs, and support staff than administrators.

Sustaining Vision

In the summer of 2005, three of the seven V-LIT II principals changed positions within the County, and in the fall of 2005 there was a transition in the superintendent's office as well, which brought up the question of a school division being able to sustain initiatives despite shifting leadership. One strategy to sustain change initiatives is to rely on a distributed leadership model. Elementary school principal Ann, one of the principals who moved to a new school, explains how she sees distributed leadership as an essential way of keeping a leader's work going, even after the departure of the leader:

> As far as if you have a vision as a leader and if you died tomorrow what will happen, it's that synergy. You need to distribute that leadership to a lot of people, because what if you do drop dead? Is the school just supposed to fall apart? No. … So the literacy specialist said, 'Well everything I've been reading talks about the importance of leadership, of bringing people on,' and that is very, very important. Part of good leadership is number one, training other people to be you and distributing the leadership so that the vision of the school that everybody comes to continues on… The danger with charismatic leaders, you know that people will die for and do anything for, is that they're not doing it for the right reasons. They're doing it because they really like that person, and if that person goes away, and they don't have the same value system, it will just fall apart…I guess I want the kind of leadership that makes the school really strong so that if you do fall away, the plant doesn't die just because one leaf falls off the plant, it shouldn't just keel over and be dead. It just shouldn't be. And technology's only just a part of that.

Ann makes a powerful statement here about how important it is for leaders to make the effort to build leadership in others so that the vision for the school lives on and can function without relying on the charisma of just one

person. She is a strong believer in a distributed leadership model, and speaks about how she trusts her CTIP to be a leader and make decisions:

> I trust her to make the best decision and she's always coming to me and saying, is this ok, so she tells me a lot. And I'm informed. But I don't feel like I always have to *be* there. And if she's feeling like I have to be the one to make the decisions she comes and says 'I'm not doing this, you have to do this.' So like we had a distribution of new computers coming into the building which can be very controversial. She came up with a plan, made sense to me, so I said go do it. That'll be fine, if anybody wants to yell they can yell at me and I said do it, that's fine, I'll take the heat for her. But she had very good reasons for what she did and I agreed with it. But I didn't feel any need to sit there and, you know, I'm one person in a building and I have to have people I can trust, this is your job, do it. Distributive leadership, they call that, what do they call that, shared leadership. I call it distributed leadership because it has to be.

Middle school principal Fran believes that "the only way to make sure that your vision lives on is if you've empowered enough to make that happen." Cheryl, another principal who changed schools over the summer, has also had the experience of trying to distribute leadership in the past when she changed positions from a CTIP to an administrator, and mentioned how she tried to keep her vision alive by handing leadership over to other teachers gradually:

> The last two years I ran the TV studio, and then thinking about my future, I was like, I really want this to keep going when I'm not there so I started to hand things over and kind of move on a little bit … The first two years I ran it, and then this year I got one of the other teachers to take it on board and so I do much more overseeing.

When transitions in administration occur in schools, there is an opportunity for leadership for non-administrators, such as the CTIP. Over the

summer, the principal at Gary's high school changed, and Gary has found that as a CTIP he is able to be the one to "drive the ship."

> I'm really kind of guiding him through everything, where you need to sign this because you're an administrator and I'm not…I'm kind of driving the ship. I think people care about what I do and I do things that are for the good of the school but nobody tells me you need to do this or we should be doing that. I've already got it going so I have a vision for what I want it to be. But when I need administrative acting on things I can definitely still go to our new principal but I kind of missed that relationship with Gordon where we were kind of both visionaries and he saw it from the administrative side.

Alice, an elementary school CTIP, discussed with me in December 2005 how her school had managed to sustain a change in leadership that had occurred over the summer:

> [The new principal] was coming with a lot of changes though… but some of the things that we were afraid he was going to bring were things that kind of didn't jive exactly with the way Rosemont County does things…But there's a core of us, and it's not just the leadership team, and when I use the term leadership team that's like the team leaders, and like me and the literacy specialist, that's one group, there's another core, core group of leaders that are really tuned into Rosemont County ways…. So we kind of gathered around him and we kept dialogues going. One time at a faculty meeting he made comments about we're not going to be doing pre-assessments and all this and kind of, it was something that was kind of against our Rosemont County way, and I'm like cringing, and a couple of us are looking, and so later we talked to him about it, and so we had a few bumps, but he listens very well. Oh my gosh, he's an incredible listener, he's very sharp, he picks and reads people well, and we have had a trust immediately. But he's brought so many changes that it's really stressed the faculty, so I've tried to lay back and smooth things both ways in that area.

Here Alice and some of the other teachers in the school, referred to here as the "core, core group of leaders" at the school because they are "tuned into" the County's vision, helped steer the new principal into making decisions that are consistent with County initiatives. It is interesting to note that Alice's former principal was Ann, the one who spoke so passionately earlier about the importance of distributed leadership. Had this core group of leaders not grown under Ann's tenure as principal, it is perhaps true that the County's initiatives may not have had a group to keep them on track under a change of leadership. Additionally, Ann and Alice are the pair with the highest correlation on the TAGLIT survey and meet the most frequently of the principal-CTIP pairs surveyed. While all of the V-LIT schools exhibited characteristics of distributed leadership to some degree, it appears that Ann and Alice's give the most explicit example of this concept which was a useful strategy in the transition to new leadership in the school.

Leadership changes in schools all the time, and without addressing strategies to deal with these changes, new initiatives (such as technology integration) may be unable to sustain the transition. In the words of Rosemont County administrator Tammy Peters:

> Life happens, and we're not the only school division right now that's in a point of limbo of some sorts, gosh, my players have changed a little bit since last time we went out on the field, that's the case in, that's

> everywhere, so how do we build a plan like this that is sustainable across those things?

By building leadership in others, principals and technology coordinators contributed to a distributed leadership model to sustain change despite shifting personnel.

CTIP and Teacher Collaboration

CTIPs as Agents of Change

The position of a CTIP can be used as part of a systemwide approach to integrate technology and other school division initiatives when CTIPs are able to exercise leadership and work within a structure that supports collaboration. CTIPs are in the interesting position of being neither an administrator nor a classroom teacher. While this has the potential of requiring leadership from someone who has no official position of authority, the CTIPs and principals interviewed see this as an advantage. Because CTIPs are not administrators, they are often viewed by teachers as being less threatening, and the comfort level for a teacher to approach them is higher:

> Because I think the comfort level over there is pretty high, I don't think the comfort level is there, going with the administrators… So you go to [the CTIP], [he] looks at the idea, I think he gives support, he'll bounce it off of me (Gordon, high school principal).

> I think people don't like to be judged, and I think people see administrators as, not waiting for them to do something wrong, but right

> there to tell them what they should be doing, and I'm a little less threatening. Kind of offering suggestions, because I have the time to figure this out, and I think this might work, so you might want to try it (Beth, elementary school CTIP).

The CTIPs position affords them the opportunity to interact with teachers in a non-threatening way. While the principal of a school has influence over many things that happen in a school, one middle school principal, Fran, points out that the principal does not have so much influence over how teachers are teaching inside their classrooms:

> The thing about this job that I didn't anticipate when I started is that I really thought I would have an influence over what teachers did in the classroom. I'm not certain why because my principals never had any influence over me in the classroom. But you have to do that outside of the classroom doors.

Fran goes on to say that since she realizes she is not in a position to strongly influence what teachers do in the classroom, she relies on leaders like the CTIP: "I found myself after my first year of not being able to make an impact in classrooms I've chosen to have a lot of folks like Fay in a couple of areas where I've put in the positions." The CTIPs are in a better position to influence what is happening inside a classroom because they are often in classrooms working in collaboration with teachers. In Rosemont County, collaboration has become very important. The work of Richard and Rebecca DuFour and Robert Eaker on professional learning communities has been widely discussed throughout the County, and many schools are putting in place structures that allow for greater

collaboration among teachers. While administrators in the County speak of the value of collaboration, this is a work in progress; in a survey of 104 teachers working in schools participating in V-LIT II, responses indicated that most teachers feel that there is at least some structure and accountability for collaboration in place at the school, but there is an apparent room for growth here.

Table 8: *Teacher survey results for collaboration*

	Yes	**Somewhat**	**No**
Is there sufficient structure (time built into schedules, guidelines) to collaborate with other teachers? (n=95)	30.5%	40%	29.5%
Are teachers held accountable for collaboration? (n=94)	28.7%	44.7%	26.6%

Collaboration remains high on a CTIP's method of achieving technology integration in the school. Collaboration happens one-on-one or within the context of team meetings, and is a more sustained way of providing professional development to teachers than workshops. Many of the CTIPs work one-on-one with other teachers:

> When a teacher comes to me and says, this is the way I teach this currently, I'd like to utilize technology to do it, …I'm gonna see if I can match up something to their idea, and share the Ideas that I have being a former classroom teacher (Gary, high school CTIP).

> I meet with every classroom teacher once a month to plan on how we can collaborate to help them with technology for that month…We look at our curriculum maps, we decide from that how we're going to implement the standards through the use of technology (Debbie, elementary school CTIP).

CTIPs also provide hand-holding and encouragement to teachers who are just learning to use technology in the classroom:

> I've offered and I keep offering…to go in and be in the room so they don't freak out, but have them substitute the SMART Board for the chalkboard for a day, and see what they think about it, and what they can do with it, so I'm going to try doing that (Beth, elementary school CTIP).

Drawing in reluctant teachers may require some special people-skills from the CTIP. Alice, for example, connected to another teacher she referred to as an "island" by asking to videotape his class so that he can use it to collaborate with another teacher:

> I think he will say yes because I think he will like being noticed. He's got rules and I know them, it's taken me four years and I've learned them, that's what being a leader is, is reading people and then knowing what rules to follow… Intuition, and people observation skills.

Another CTIP also discussed finding ways of drawing in reluctant teachers:

> There are some teachers that are very eager and they come to me and they want to know everything, and there are other teachers that are reluctant and you still have to get to them, and that's just finding one little hook, like check this out, you really have to know the teacher (Connie, elementary school CTIP).

This one-on-one collaboration relies on the individuals' motivation to sacrifice a free planning period or time after school to get together. Though Connie and Alice found ways of drawing in reluctant teachers, a CTIP does not

have the time to work with every single teacher one-on-one. Offering workshops after school also rely on busy teachers giving up time to attend, and have had mixed results. Alice, an elementary school CTIP, has found that when there is a lack of structured time for her to meet with faculty, it can be a source of frustration:

> I never have access to the staff to share things as a whole staff, I've been here 4 years…I've stolen a few times, I have a meeting I called yesterday for this afternoon at 3:15 …We have new computers in the rooms, we have a new operating system for most of them, the lab just got re-imaged, and I communicate through emails. I try not to write too long of emails, and I segment things, and I try to make it so it's very explicit… but I really don't ever have access to the staff as a whole, and even today, I won't get them all because first of all it's sort of an invitation, it is a long day, it will be interesting to see who shows up. But that's been frustrating, to a certain degree throughout my entire career.

Structure and Accountability

Providing structure and accountability for collaboration can facilitate collaboration. This is generally not controlled by the CTIP, but by the principal. Having scheduled meeting times for grade-level teams to meet together with specialists such as the CTIP, library media specialist, and literacy specialist will encourage greater collaboration:

> I go to their team meetings that they have once a week, and I listen, I look at their curriculum maps… and I'll say, oh, you're working on energy, and I'll just send the one little thing, or show them in their meeting, look at this really cool website, or resource, and they're usually, 'oh yeah, that's great' (Connie, elementary school CTIP).

Without a structure put into place such as scheduled meetings, it is "pretty much based on an individual thing if you really feel like you wanted to talk about it, if there's something that you really thought that you needed to share with the teachers" (Debbie, elementary school CTIP).

Bill, an elementary school principal, explains what collaboration is:

> The idea is that teachers are working collaboratively in grade level teams on curriculum and instruction and trying to help each other essentially by looking at what their strengths are and their weaknesses are and how they can improve as a team. The main requirement is that teachers meet regularly in those grade level teams to look at curriculum, to look at the assessments, to develop common assessments so they can gauge how well their students are performing. And so, principals across the division are in different places in terms of that implementation. We just started that work this year and so some of the principals have mandated that their teachers meet weekly. Some of the principals have provided time in their schedules to do that other principals have not had that ability and have not mandated that their teachers meet.

Bill worked to put a structure in place in the 2005-2006 school year to encourage greater collaboration among his teachers, and especially to provide opportunities for his CTIP to collaborate with grade-level teams by creating times in the schedule for team meetings and providing substitute teachers when necessary.

The CTIP who is also the library media specialist at this school now meets with each grade level team during the second week of the month for at least half an hour about what they are doing in the classrooms and how she can help them

to integrate technology. She uses the meeting times to make suggestions to the teachers as well as some training.

Bill, the principal, feels that this has been a successful model:

> With our grade level planning time, [the CTIP] meets with teachers about once a month, and so as a result of that, teachers are doing some really cool things. And that's just gotten off the ground within the last month or so, and it's really exciting, and an aside is that our teachers are using technology much more than they did last year. A lot more. Significantly more.

Structure, however, is not enough on its own. There must be some accountability and a focus on instruction. Fran, a middle school principal, attended a DuFour conference on professional learning communities and learned that she should request her teachers to focus on instruction and to report back to her about what is accomplished in the meetings:

> We have the time built in…I went to the DuFour conference and got how to structure it so that, I was not just requesting it, I was also asking for feedback from it. So instead of my teachers talking about… we used to sit and argue about why they need to go out in the hallways at the change of classes. But now we can talk about how to reach children through this assessment and so the focus is on kids and learning, versus management. So that's been the major shift in our building… So my teachers definitely have team planning in their schedule every single day of the week. So there's definitely ways to collaborate, for like between the three language arts teachers. There's also time for collaboration where they have to spend another 45 minutes, it's built in, for the special ed and the regular ed teachers to collaborate.

Collaborating together can not only be an opportunity for the CTIP to provide professional development, but it can also serve as a motivator for teachers. Bill believes that when other teachers observe one of their peers using technology, then using technology becomes a more realistic goal for them. Elle also discusses collaboration as a motivator:

> Because the teams collaborate, I think that they'll say, people will come to me and say could we talk about that, that thing that we did, and so how could we facilitate that, and they kind of jazz each other up (Ellie, elementary school CTIP).

Collaboration also seems to be influenced by the size of the school. Gary, a CTIP at a large high school, noted:

> We do have a vehicle to exchange files and things like that over our network, there have been instances where the teachers have demonstrated what they're doing in their classroom at the monthly faculty meeting, but there hasn't been a lot of staff development dedicated towards just exchanging ideas. That seems to be, there's the 'no time' excuse, and it's kind of a luxury-type thing.

A smaller elementary school has fewer teachers and may be able to get their teams together more often:

> Every grade level collaborates, but our grade levels, we only have two or at the most three teachers teaching in a given grade level, and they get together pretty often…The second grade teachers, there are three of them, and they'll get together and have lunch together really frequently and go over what they're doing and collaborate. (Beth, elementary school CTIP)

> It's because we're really small, the teachers interact with each other all the time. There is a real collaborative kind of culture, they have common planning, they see each other constantly, everyone knows everything

about everyone, for better for worse, all the time. (Diana, elementary school principal)

An analysis by elementary and high school levels indicates that the elementary school teachers feel that they have more structures in place for collaboration; 38.2% of the elementary respondents indicated that there is sufficient structure, such as time built into schedules and guidelines, for collaboration with other teachers. This is twice the percentage of high school teacher respondents who felt that there is sufficient structure for collaboration. Because there were so few responses from the middle school, they are not counted here.

Table 9: *Teacher survey responses by elementary and high school levels for collaborative structures*

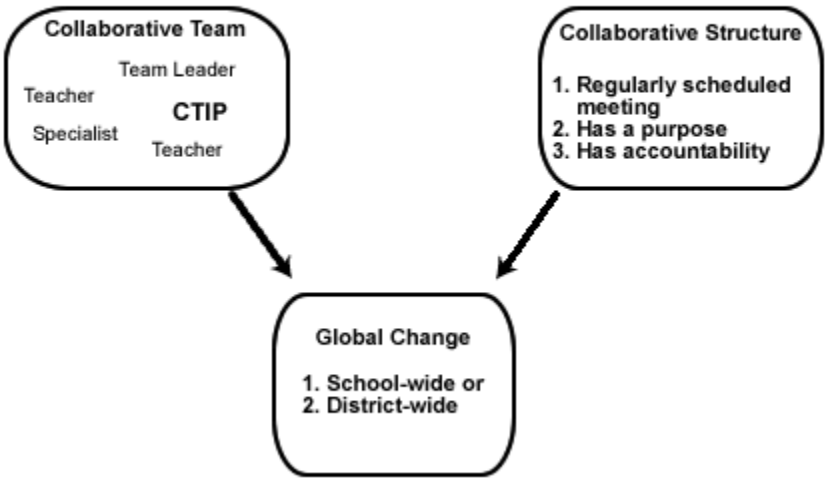
Question: Is there sufficient structure (i.e. time built into your schedule, guidelines) to collaborate with other teachers?

	Yes	**Somewhat**	**No**
Elementary school (n = 58)	38.2%	44.1%	17.6%
High school (n = 34)	19%	50%	17.6%

Collaboration is so important because in order for global change such as technology integration to occur within a school division, a specialist such as a CTIP, the conduit through which the initiative reaches teachers, must have the structure of collaboration provided for quality face-to-face time with teachers.

Having a collaborative structure in place does not guarantee that change will occur, but it is a precondition for the success of school or County initiatives.

Figure 1: *Preconditions for global change*



Offering workshops or working one-on-one can help to achieve systematic change, but it is not enough. After-school workshops may not be well-attended if they are voluntary, and may not fit an entire staff's needs if they are mandatory, as one-size-fits-all technology trainings tend not to. Staff development days come infrequently and can be quickly forgotten when the day-to-day demands on a teacher return. Systematic change requires a sustained approach of a specialist working continuously and closely with teachers. The CTIP has the potential to be a powerful change agent when used in this way. While they are neither administrators nor classroom teachers, they can "lead from the middle."

Additionally, CTIPs can help interpret a school division's vision to fit in with the local culture of their own particular school.

The Roles of Risk-taking and Trust

Risk-taking

To change one's teaching is to take a risk. According to the National Educational Technology Standards for Administrators, educational leaders need to "foster and nurture a culture of responsible risk-taking and advocate policies promoting continuous innovation with technology" (ISTE, 2002). It is the role of the school leaders to foster and nurture this culture. Without a culture of risk-taking, there will still be teachers who take risks, but they will be the exceptional teachers who are drawn to new approaches, who are the early adopters and would be in any environment. There would still be teachers using technology, but they would be the younger teachers who feel more comfortable with technology anyway, as high school principal Gordon points out:

> The younger teachers who are comfortable with technology aren't risk-takers; they're performers. They do it. The older teachers who are uncomfortable with technology are unlike anyone else dealing with anything else. A little fearful, and therefore not as prone to try it. I think that the administrative leadership that's in the building for this school year is asking people to step out there and to do things that are different.

Gary, the CTIP at Gordon's school, has a similar view of the teaching staff at the high school:

> It is, not to kind of stereotype, but it is an older staff that tends to be a little more conservative about trying new things in the classroom when they've had success using old ways, and I think there probably is some mentality of I'll teach the same year 25 times and be done, which is scary to me, but at the same time I've seen a lot more…you have to build that trust, so that's coming along, and I've seen more and more requests for different equipment, different software, and so people are kind of warming up to it.

The administration's role is to foster and nurture this culture that gently pushes teachers out of the comfort zone of repeating the same lessons year after year. Fran, a middle school principal, sees herself as a risk-taker and a promoter of a risk-taking culture at her school:

> I'm a risk-taker. I won't change. My staff knows that. So that means they've had to go through some transition with me. … So as far as risk-taking goes, I would say that as a leader of the building, that's something that I'm demonstrating, and they're seeing... I don't think teachers are very big risk takers, and as a generalization, I think I have my share of them, just like everybody would have, I do think since I'm not at all uncomfortable with taking a risk, I don't know how teachers got it, I don't know how we in the teaching profession got it in our mind that we needed to do next year what we're doing this year. There's just no way to get better if we do that.

The CTIP can also model risk-taking, as Debbie does:

> I think in my case people know that I'm willing to take a risk, that I like to learn new things, and I'm not afraid to say I don't know how to this, but I'm going to find out. I think there's a real mixed bag of that in the building. I know we've got a real wide range of that, I know there's somebody down on the younger, and I don't mean to compare with age, but it sort of does have something to do with age, people who are right

> out of college in the last two or three years, they just jump right in, whereas some people who have taught for a long, long time, and have wonderful expertise at teaching, are really phobic when it comes to technology… but I'm trying my best to do some hand holding.

Trust

In the quotation above, Debbie discusses helping people to take risks by doing "some hand holding." This is an important aspect of creating a culture that fosters and nurtures risk-taking. It is not enough for leaders to model risk-taking, but they must also let teachers know that there is enough support available to them to catch them when they fall. It is this trust that, in the words of elementary school principal Bill, will get them "over the hurdle of knowing how to use it, the concern about 'if it fails when I'm in the middle of my class, what am I gonna do?'" A teacher or even a principal is less likely to test out new technology if there is not someone available to assist when problems arise:

> Half the time I learn how to do something accidentally or just by playing around, get comfortable enough to play around or whenever I totally think I've messed something up horribly I just call [the CTIP] or somebody to come in and straighten me out and they always do (Diana, elementary school principal).

> Change is hard, but most many at this building jump right in, and more do so with appropriate guidance & support (Teacher survey respondent).

The trust should exist not only at the building level, but also with the school district, as Diana speaks about here:

> So if there's something that someone here can't do, the Office of Technology, they really are good about walking you through the problem or sending someone down, and that's a really good, that will increase you to being a risk-taker is when you know somebody can get you out of a jam really quickly. There's some times when I thought, oh no, what have I done, I broke it.

Many of the principals and CTIPs spoke very positively about County initiatives having "clear well-defined expectations" and worthy goals, perhaps somewhat because the County administrators take time to explain how these initiatives work together to the CTIPs and principals. V-LIT II participants spoke about not only trusting the school district, but specifically singled out administrators. Two principals spoke about why they decided to participate in V-LIT II, even though they have so many other things on their plate:

> Well, without knowing the details of it but because Tammy usually runs experiences for us that are hands-on, directly applicable, they're usually just worth my time. And so when she sends out something, Tammy also has, quite honestly, Tammy's also been real helpful in my school's process for moving from teachers working as individuals, shutting their doors, to teachers working together. And she's been kind of the County person that I've had access to in this building to help me with that process, so again, if Tammy's going to run it, I'm going to sign on, and vary rarely have I ever been disappointed. (Fran, middle school principal)

> I feel like Tammy is such a wealth of information and knowledge that any time I can pick her brain, it's gonna help me… I just have such admiration and respect for Tammy, I figure if Tammy tells me I'd do it, I probably just ought to do it, not argue with her. She's helping my staff with curriculum mapping, I don't know, she just knows so much, I just so admire her. (Ann, elementary school principal)

Gary spoke of teachers needing to trust the CTIP to try out new technologies in the classroom. Ann spoke earlier of trusting her CTIP Alice to make decisions. And both CTIPs and principals spoke about trusting administrators and the County to, in the words of CTIP Alice, "never put hardware before good pedagogy and just good teaching." When the teachers and administrators have faith in the school district administration, they are more willing to adopt the systemwide approaches. The trust in the County's systemwide approaches may counterbalance the innovation overload so common in schools today. When teachers and administrators like Fran and Ann have faith in a school division administration enough to know that any initiative is only designed to create better learning and teaching situations, they express a willing attitude to sign up for a new initiative, even when their plates are already full. A distributed leadership model could not exist without a level of trust in place among the school administrators and the teachers.

During the summer of 2005, three out of seven principals – nearly half of the V-LIT II principals – were moved to new schools by Rosemont County. While these moves were certainly made to make improvements in Rosemont County schools, there is a consequence to the trust that exists in a CTIP-principal relationship. The County has two competing interests here: one is to build trust among personnel so that a distributed leadership model can occur; the other is to

create a functioning school system where gaps are filled according to the schools' needs. These two interests are at odds with each other, as trust depends on the stability of the relationship, yet the County needs to place principals in schools where they can be most useful. Relationship-building has to start all over again when trust is undermined by the shifting around that occurs when administrators move to new schools. Connie, for example, had a close relationship with her principal, Cheryl, during the time that Connie was a teacher at the same elementary school. During the summer, Connie was asked to replace the CTIP who had left the County, and she took the job because she was looking forward to working with Cheryl. After Connie's decision to take the CTIP job, Cheryl was moved to a different school in the County, and Connie expressed her disappointment:

> And I always worked with Cheryl since the school opened, because [we were] 'simpatico' on technology ideas, and so we worked together and when it was time to find a new CTIP she asked me to do it…. [When she moved] I was really disappointed. She was the reason I took this job, so I could work with Cheryl.

Connie continued to be involved with V-LIT II, even though Cheryl's replacement was not. Other CTIPs who lost their principals, Alice and Gary, continued to be involved with V-LIT II, even though their new principals were not; all three of the principals who moved to new positions attended the National Educational Computing Conference, and two of the three attended the January

2006 V-LIT II meeting, with one principal, Ann, bringing her new CTIP along in an attempt to "cross-pollinate" V-LIT II between her old and new schools. If the County is serious about working on the CTIP-principal relationship, the consequences of shuffling principals around need to be carefully considered. Trust is important in increasing risk-taking and the likelihood of innovation implementation while reducing the sense of overload.

CHAPTER FIVE

SUMMARY AND DISCUSSION

Introduction

Currently schools are trying to implement numerous initiatives in the United States (Fullan, 2001a), and technology is just one of them. These initiatives originate from the federal, state, and local levels. Implementing them presents major challenges to educational leaders. Some leaders are interested in greater technology integration in the classroom to be used to prepare students with 21st century skills, to teach content more effectively, and to appeal to today's Millenial and Generation Y learners (Morrison & Bowen, 2006). In order to realize this potential of technology, a school and its teachers need to be strategically led through the process by educational leaders who understand the process and complexities of change (Fullan, 2001a; Hannay & Denby, 1994).

The subjects of this study were some of the leaders who are involved in Rosemont County's efforts to bring more technology integration into its schools. Not only do principals have an important role in communicating a vision for

change and creating structures to enable the change to happen, but their ability to build leadership in others can greatly facilitate the change process. CTIPs in leadership roles have been able to act as change agents in Rosemont County, not only for technology integration, but in other County initiatives as well. It becomes important, therefore, to address the leadership of the CTIPs in Rosemont County schools.

Synthesis of Findings

Research Question One: How is technology leadership defined by the teachers, CTIPs, and administrators of Rosemont County?

The CTIPs and principals participating in this study all discussed what they believe technology leadership means (included in Appendix H). Some respondents felt that technology leadership is just general school leadership principles applied to technology integration. Four common themes emerged from the responses:

1.) Technology leaders have a clear vision for learning and how technology can support learning;

2.) Technology leaders relate and communicate;

3.) Technology leaders support and enable teachers to use technology; and

4.) Technology leaders build leadership in others.

Vision is a defining characteristics of leadership, and is crucial to any change process (Leithwood et al., 2004; Kouzes & Posner, 1987). This vision must be based on an understanding of how technology influences student learning. A technology leader is responsible for having this knowledge of technology in order to have a vision for using technology to enhance learning. Without that understanding, a leader risks focusing on hardware purchases rather than how technology might be used in the classroom. There are indications in this study that an understanding of technology is very important to teachers; in the survey of teachers in schools of V-LIT II participants, individuals who were cited as leaders were generally cited for their knowledge of technology as well as how they used technology with students.

The V-LIT II participants spoke about the importance of vision. These visions articulated by the principals and CTIPs sometimes were hardware-focused (teachers will use SMART Boards in instruction, students will have access to wireless laptops); instructionally-focused (teachers and students will use technology as a tool for learning); or proficiency-focused (all of our school's teachers will become certified in the Technology Standards for Instructional

Personnel by the end of this year). A technology plan details the steps required to achieve that vision. There were differing opinions among the V-LIT II participants as to the importance of a technology plan. While the International Society for Technology in Education advocates the creation of a technology plan, the principals and CTIPs were almost evenly divided regarding the need for a school technology plan. Despite the importance the participants placed on vision, there were varied opinions regarding how to formalize and communicate that vision: whether it should be through 1) creation of a separate school technology plan; 2) integration into a comprehensive School Improvement Plan, 3) using either the County technology or comprehensive plan, or 4) making decisions intuitively on a day-to-day basis. These differences in beliefs suggest a lack of shared vision in those schools, despite the belief expressed that shared vision is important. The findings of this study indicated that frequent meetings between principals and CTIPs are a key to achieving a common understanding of technology planning.

Research studies on innovation suggest the importance of communication as the "veins and arteries of new ideas" (Kouzes & Posner, 1987, p. 56; Marcovitz, 2000). Without sufficient attention to communication on a daily basis, even the best-laid vision will stall. One of the ways in which this can be communicated is through modeling. CTIPs in this study do this on a regular basis. The principals

also listed modeling as an important objective but found it more difficult to achieve; three principals stated the desire to use SMART Boards during faculty meetings or set up their own projector rather than relying on the CTIP. A principal's actions, such as attending training sessions, are a way of measuring the principal's support of an innovation, and are good indicators of the innovation's future success (Berman et al., 1979). When principals share the learning process that teachers go through to use new technologies, they model not only the use, but also the learning process. Principals may be able to subsequently relate more closely with teachers. Recent literature on leadership addresses the importance of relationships and a leaders' ability to relate to others (Bryk & Schneider, 2002; Fullan, 2001a; Newman & Wehlage, 1995). A CTIP with teaching experience has more credibility with teachers and can relate to their needs more effectively.

A technology leader removes barriers and provides structures that enable teachers to integrate technology. Principals who are technology leaders provide structured time for collaboration so that the CTIP can meet with teams, provide substitutes for teachers to attend training sessions, and purchase the hardware or software that is needed by teachers. CTIPs who are technology leaders plan professional development, help teachers find resources, make arrangements for equipment, and are present during lessons to support teachers. Leaders can also

foster a culture at the school that makes risk-taking acceptable, encouraging teachers to explore new and innovative teaching approaches. When teachers feel that they have adequate support, they are more likely to take risks. In their book *Trust in Schools* (2002), Bryk and Schneider assert that trust is an important element in motivating teachers and administrators to adopt school reform.

Highly successful leaders develop and count on contributions from other people at their school in a distributed leadership model (Leithwood, 2005). Leaders rely on the perspectives and capabilities of individuals throughout an organization. Furthermore, leaders take steps to help others rise, trusting them to make decisions and giving them chances to demonstrate their abilities.

Research Question Two: What are the defined and operational roles of the CTIPs and principals at each school with regards to technology leadership? How can the relationship between the principals and CTIPs be characterized?

The role of the CTIP, created in 2001, is a relatively new one. Rosemont County and school divisions across the country are trying to determine how to best use these positions. There is often ambiguity about the role of technology coordinator because it has been changing over the last decade. In Rosemont County, technology coordinators were previously traveling consultants working

with multiple schools. Initially the role involved instructing teachers how to use email and other productivity tools. Subsequently, a laboratory support model emerged. Today the role has been redefined as a curriculum integration partner.

The multiple dimensions of the CTIP role contribute to the confusion. They often simultaneously act as technical support staff, webpage designers, curriculum experts, and professional development trainers (see Appendix G for a description of the Rosemont County CTIP position). They are also in this unusual position of being neither a classroom teacher nor an administrator. This ambiguity has been a barrier to some of the CTIPs in Rosemont County in their struggle to define their role. This role changes from school to school, often depending on the school's size and whether the CTIP has multiple jobs. According to Rosemont County's technology plan, CTIPs are provided to each school on at least a half-time basis to provide on-site training in the form of modeling, co-planning, and co-teaching. This description does not mention the leadership that CTIPs provide in many schools. Many CTIPs are perceived as leaders by the teachers and principals who work with them. CTIPs have the potential to be change agents. The CTIPs are unique in their access to teachers, principals, and district administrators. They are able to interact with these three groups in a way that few other personnel can, providing an opportunity to have conversations about new initiatives occurring in the County on multiple levels.

Consequently CTIPs have a global view of what is happening in the County and at the building level as well.

The relationship the CTIP has with the principal and the support the principal gives to the CTIP are crucial to the leadership of the CTIP. While most principals do not have any official technology role other than approving purchases and staff development, they are the instructional leaders in the building. They have everything to do with promoting their vision for instruction and how technology fits into that, as well as providing structures that enable teachers and CTIPs to integrate technology, such as building collaboration time into schedules. Principals can also promote an atmosphere of risk-taking at the school, letting teachers know it is acceptable (and an expectation) to try new approaches to teaching and learning through technology. By modeling technology use and including technology in teacher evaluations, principals send a message of what is valued and expected. Principals can also model collaboration by working with CTIPs to co-create the vision for technology integration at the school and meeting often to make decisions together. Judging from the disparate views among V-LIT II participants on the value of technology planning, Rosemont County may want to consider investing time and energy in the creation of shared visions.

Frequent meetings appear to allow the CTIP and principal to develop a common understanding of technology implementation in their school. There is no clear evidence that formal, standing meetings with CTIPs and principals are preferable to informal meetings, so long as they occur. Because the CTIP spends more time in classrooms and collaborative meetings and has closer contact with teachers than a principal, a CTIP has a more direct influence on classroom practices. The principal then needs to trust and rely on the CTIP to communicate the school's vision for learning with teachers and to make decisions in accordance with the vision. This is a characteristic of distributed leadership. It is difficult for principals to remain current with technology innovations, but they still need to stay informed about how technology can influence student learning. The CTIP can be the person on whom the principal relies to help make decisions about technology in the building, especially because of the close relationship with teachers the CTIP often has. V-LIT II was designed to nurture the relationship between the principal and CTIP. For most participants, this was already strong, characterized by trust, distributed leadership, and frequent communication, but a few pairs acknowledged the need for more structured time together.

Research Question Three: What processes and outcomes do these principals and CTIPs expect from the V-LIT II technology leadership project, and to what extent do they feel V-LIT II is meeting their needs?

The principals and CTIPs of V-LIT II joined this initiative without a comprehensive understanding of what the project would encompass, but expectations included:

- Developing the CTIP-principal relationship
- Providing professional development for principals that built upon V-LIT I
- Modeling collaboration for teachers
- Providing opportunities for technology planning
- Working with Rosemont County administrators

Overall the participants had only a general notion of the V-LIT II activities. Agreement to participate under these conditions reflected trust based on past experience. It seems unlikely that any of these principals and CTIPs would have been willing to give up their time to participate in something they did not believe would have a positive influence on their ability to perform their job.

The ambiguity in V-LIT II was compounded by changes in personnel during the summer of 2005; three principals moved to new schools within the County, one CTIP left the County, and central office leadership also changed.

Basing the initiative on the calendar year rather than the academic year and failure to plan for personnel changes negatively impacted V-LIT II. However, when I interviewed the participants in December 2005 and observed a V-LIT II meeting in January 2006, there was a very positive reaction to the few V-LIT II events that had occurred. Not only did both principals and CTIPs acquire concrete and practical ideas about technology use that they felt might be useful to their school, but they found some real value in spending time together outside of the context of school meetings. Several reported some meaningful discussions, sharing of ideas, and furthering of relationships as a result.

The original memorandum between Rosemont County and the V-LIT Project had a one-year timeline ending in January 2006. In the January 2006 meeting the participants expressed an intention to sustain the initiative because of its value to them. Principals and CTIPs discussed topics for future meetings (inviting in teachers and/or media specialists) and requested a long-term calendar to help with advance planning. The CTIPs and principal pairs indicated willingness to make presentations together at future conferences.

In summary, the participants agreed to participate in V-LIT II without clear expectations other than the broad goals of the project. The job transitions that occurred proved disruptive, but the summer conference and associated meetings were a success according to the participants. The project deliverables

listed on the Rosemont County/V-LIT *Memorandum of Understanding* such as presentations by the principals and CTIPs at the Virginia Department of Education Educational Technology Leadership conference were not fulfilled. The participants expressed a desire to continue to meet and collaborate on developing technology leadership in Rosemont County, but it is unclear if other demands on participants' time will allow this to occur.

Implications

During the January 2006 V-LIT II meeting, Rosemont County administrator Tammy Peters addressed the group:

> For the first time in Virginia, every principal should have a CTIP-like person in their school, not necessarily at the level that we have…and many principals have never had a person, and the legislation says clearly its not a lab teacher. The legislation says clearly that it's a technology resource teacher….Many people don't know how to use that CTIP person in a role that does change what happens in classrooms.

Tammy is referring to legislation passed in Virginia that requires schools to fund one technology support person and one instructional technology resource teacher for every 1,000 students (DeMary, 2005). Many schools have never had such a technology resource teacher. Consequently, there are professional development needs for both technology resource teachers and principals as school districts attempt to determine best use of this position. Some

of the practices that school districts can employ in using the technology resource teacher identified in this study include:

1.) provide professional development for technology resource teachers that includes leadership development and workshops on planned initiatives in the school district that are planned around the academic year rather than the calendar year;

2.) provide collaboration time that allows the technology resource teacher to meet with teams, while also holding teachers accountable for collaboration;

3.) include technology resource teachers in school improvement and lead teacher/department head meetings;

4.) arrange for regular meetings between technology resource teachers and principals, school district administrators, and other technology resource teachers; and

5.) choose technology resource teachers who have teaching backgrounds and good leadership skills.

It may not be surprising that CTIPs have the potential to be change agents. The importance of *access* to various groups of people in order for the CTIP to be a conduit for school district initiatives emerged as an important finding for this study. The CTIP position is most effective when this person has close and

sustained access to teachers, administrators, and other CTIP colleagues. Structures must be put in place in order for this to happen, such as collaborative meeting time with teachers, and regular meetings with principals and district administrators who work with the group of CTIPs as a whole. This is consistent with the literature on school change, which indicates that knowledge-sharing structures are essential for change such as technology integration to take place (Fullan, 2001a; Strudler, 1995-96).

As they think about how to structure the technology resource teacher's job, school districts can work to avoid the misunderstandings that can arise as to the exact role of the technology resource teacher. It should be made as clear as possible to teachers, the principal, administration, and the technology resource teachers themselves that this position is not a lab teacher nor a technician, but rather a curriculum specialist. This model is consistent with previous studies of technology coordinators which indicate that time spent on technical maintenance or as a lab teacher are a major barrier to technology coordinators acting as leaders (Lai, Trewern, & Pratt, 2002; Scot, 2005). In a minority of cases the ambiguity of the role has not been an issue; these CTIPs have made it clear to their teachers and principals that they are curriculum specialists and not technicians nor lab teachers.

In addition to structuring collaborative meeting time, there are other steps that principals can take to act as technology leaders in their buildings. First and foremost they must ensure that a vision for technology integration is in place and communicated to the staff. This vision should be connected to other initiatives and communicated in a way that makes sense to teachers. Modeling has emerged in this study as an important aspect of leadership. When principals attend workshops offered by the technology resource teacher or take risks themselves by using a new technology, this sends a message about what is valued at the school and expected of teachers. Including technology integration in the evaluation of teachers also informs teachers that it is valued, though whether technology is used for the sake of using technology or to teach content is not necessarily evident.

A number of these findings are consistent with the National Educational Technology Standards for Educators that state that educational leaders should

> "inspire a shared vision for comprehensive integration of technology and foster an environment and culture conducive to the realization of that vision, model the routine, intentional, and effective use of technology…create and participate in learning communities that stimulate, nurture, and support faculty and staff in using technology for improved productivity… [and] maintain awareness of emerging technologies and their potential uses in education"(ISTE, 2002).

The NETS-A guidelines are based on the beliefs of national technology leaders. There has been little research to confirm or deny the accuracy of these beliefs. A

literature review for this study found little research related to technology leadership, particularly research that includes the technology coordinator. Contributions were made not only to the field of technology leadership, but also to how technology leadership can be defined.

Limitations

This study is limited by its lack of generalizability. The subjects in this study represent a homogeneous group – they are from the same school division and have little variance in socioeconomic status of student populations. Because only one school district was examined, the findings of this study may not be transferable to other school districts with dissimilar conditions and structures. Additionally, all of the participants in this study volunteered to participate in a district initiative to promote technology leadership, and thus already possessed an interest in this area.

Principals and CTIPs who volunteer for a technology leadership initiative generally have a good working relationship and a willingness to invest energy in improving it. A study of this population is unlikely to reveal as many barriers to technology leadership as a study of a population closer to the center of the distribution curve. However, this population can reveal some of their practices in technology leadership which may be useful to other school districts in the

process of establishing comparable positions. The participants in this study have a heightened interest in technology leadership and were able to give thoughtful and descriptive answers to my interview questions. There is a benefit gained from studying subjects at the higher end of the spectrum; studying a population who is already exhibiting many of the characteristics of technology leadership can provide insight into best practices.

Recommendations for Future Research

Since a population of participants who were already aiming to improve technology leadership was examined in this study, what we know about the subject would be enhanced by extending the research to other contexts and communities. Additionally, research on populations with different models of Rosemont County's CTIP program may reveal more barriers to technology than this study did.

Because we are early in our understanding of technology leadership, particularly as it relates to technology coordinators, a mixed-method design with a heavier emphasis on qualitative research was used. It is important first to gain an understanding of the phenomena before trying to measure it. As we

understand technology leadership more, quantitative measures become useful for research as we attempt to generalize the findings to larger populations.

The disparate views on technology planning merit future study. A movement toward larger initiatives that tie many smaller initiatives together, as is currently found in Rosemont County, may result in the view that a technology plan is best incorporated into a larger plan. This view is also part of a dialogue that is happening at the national level as the federal government incorporates school reform in a large single initiative. Additionally, the difficulty of sustaining changes in the face of changing personnel emerged as a significant finding and merits future study. This study indicated that leaders who build leadership in others and use a distributed leadership model can use that strategy to absorb the disruptions of shifting administrators and staff.

Conclusion

Even though school change can be difficult to achieve, there are some steps that can be taken in technology integration, particularly by making good use of the CTIP position and enabling the CTIP to take on a leadership role in the school. Principals play an important part in helping the CTIP to be a leader by providing structures for collaboration, modeling, including technology in teacher

evaluations, and creating and communicating a vision for technology integration in the school. These steps are becoming more important as other school districts new to having a technology resource teacher attempt to make the best possible use of this position.

REFERENCES

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

Bailey, G., & Lumley, D. (1995). Technology planning: A toolkit for administrators and school board members. Retrieved September 7, 2005, from http://netc.org/cdrom/toolkit/html/toolkit.htm

Becker, H. J. (1994). Mindless or mindful use of integrated learning systems. *International Journal of Educational Research, 21*, 65-79.

Bennett, N., Wise, C., Woods, P., & Harvey, J. A. (2003). *Distributed leadership*. Nottingham, UK: National College for School Leadership.

Berman, P., McLaughlin, M., Pincus, J., Weiler, D., & Williams, R. (1979). *An exploratory study of school district adaptations*. Santa Monica, CA: Rand Corporation.

Bryk, A., & Schneider, B. (2002). *Trust in schools: A core resource for improvement*. New York: Russell Sage Foundation.

Bull, G., & Garofalo, J. (2004). Internet access: The last mile. *Learning & Leading with Technology, 32*(1), 16-21.

Bull, G., Knezek, G., Roblyer, M. D., Schrum, L., & Thompson, A. (2005). A proactive approach to a research agenda for educational technology. *Journal of Research on Technology in Education, 37*(3), 217-220.

Christmann, E., & Badgett, J. (1999). A comparative analysis of the effects of computer-assisted instruction on student achievement in differing science and demographic areas. *Journal of Computers in Mathematics and Science Teaching, 18*(12), 277-288.

Creighton, T. (2003). *The principal as technology leader*. Thousand Oaks, CA: Corwin Press, Inc.

Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. New York, NY: Teachers College Press.

DeMary, J. L. (2005). Superintendents memo no. 1. Retrieved February 25, 2006, from http://www.pen.k12.va.us/VDOE/suptsmemos/2005/int001.html

Dexter, S. (2002). Etips - educational technology integration and implementation principles. In P. Rodgers (Ed.), *Designing instruction for technology-enhanced learning* (pp. 56-70). New York: Idea Group Publishing.

Dexter, S., Anderson, R. E., & Ronnkvist, A. (2002). Quality technology support: What is it? Who has it? And what difference does it make? *Journal of Educational Computing Research, 26*(3), 287-307.

Dooley, K. E. (1998). Change facilitation and implementation: A model for school diffusion of computer technology and telecommunications. *Planning & Changing, 29*, 173-186.

DuFour, R., & Eaker, R. (1998). *Professional learning communities at work: Best practices for enhancing student achievement*. Bloomington, IN: National Educational Service.

DuFour, R., Eaker, R., & DuFour, R. (2005). Recurring themes of professional learning communities and the assumptions they challenge. In R. DuFour, R. Eaker & R. DuFour (Eds.), *On common ground: The power of professional learning communities* (pp. 7-29). Bloomington, IN: National Educational Service.

Eastwood, K., & Louis, K. (1992). Restructuring that lasts: Managing the performance dip. *Journal of School Leadership, 2*(2), 213-224.

Frasier, M., & Bailey, G. D. (2004). *The technology coordinator's handbook*. Eugene, OR: International Society for Technology in Education (ISTE).

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

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

Fullan, M. (2005). Professional learning communities writ large. In R. DuFour, R. Eaker & R. DuFour (Eds.), *On common ground: The power of professional learning communities* (pp. 209-223). Bloomington, IN: National Educational Service.

Gates, B. (2005). National education summit on high schools, prepared remarks by Bill Gates, co-founder. Retrieved September 9, 2005, from http://www.gatesfoundation.org/MediaCenter/Speeches/BillgSpeeches/BGSpeechNGA-050226.htm

George Lucas Educational Foundation (2004). Technology integration. Instructional modules. Retrieved June 10, 2005, from http://www.edutopia.org/modules/TI/What.php

Gerstner, L., Semerad, R., Doyle, D. P., & Johnston, W. (1994). *Reinventing education: Entrepreneurship in America's public schools*. New York: Plume/Penguin.

Hannay, L. M., & Denby, M. (1994, April). *Secondary school change: The role of the department heads.* Paper presented at the American Educational Research Association, New Orleans, LA.

Hedges, L. V., Konstantopoulos, S., & Thorenson, A. (2003). Studies of technology implementation and effects. In G. Haertel & B. Means (Eds.), *Evaluating educational technology: Effective research designs for improving learning* (pp. 187-204). New York, NY: Teachers College Press.

Heifetz, R. (1994). *Leadership without easy answers*. Cambridge, MA: Harvard University Press.

Huberman, E. A., & Miles, M. B. (1994). Data management and analysis methods. In N. K. Denzin & Y. S. Lincoln (Eds.), *The handbook of qualitative research*. Thousand Oaks, CA: Sage.

Hughes, M., & Zachariah, S. (2001, May). An investigation into the relationship between effective administrative leadership styles and the use of technology, *International Electronic Journal For Leadership in Learning*.

International Society for Technology in Education (ISTE). (2002). *National educational technology standards for administrators.* Eugene, OR: ISTE.

Kotter, J. (1996). *Leading change*. Boston: Harvard Business School Press.

Kouzes, J., & Posner, B. (1987). *The leadership challenge: How to get extraordinary things done in organizations*. San Francisco: Jossey-Bass.

Kozma, R. B. (1991). Learning with media. *Review of educational research, 61*, 179-211.

Lai, K.-W., Trewern, A., & Pratt, K. (2002). Computer coordinators as change agents: Some New Zealand observations. *Journal of Technology and Teacher Education, 10*(4), 539-551.

Leithwood, K. (2005). A review of the research: Educational leadership. Retrieved September 8, 2005, from http://www.temple.edu/lss/pdf/Leithwood.pdf

Leithwood, K., Louis, K. S., Anderson, S., & Wahlstrom, K. (2004). *How leadership influences student learning*: The Wallace Foundation Center for Applied Research and Educational Improvement, Ontario Institute for Studies in Education. Retrieved September 8, 2005 from http://www.wallacefoundation.org/WF/KnowledgeCenter/KnowledgeTopics/EducationLeadership/HowLeadershipInfluencesStudentLearning.htm

Leithwood, K. A., & Riehl, C. (2003). *What do we already know about successful school leadership?* Philadelphia, PA: Temple University Laboratory for Student Success.

Lenhart, A., Madden, M., & Hitlin, P. (2005, July). Teens and technology: Youth are leading the transition to a fully wired and mobile nation. Retrieved September 9, 2005, from http://www.pewinternet.org/pdfs/PIP_Teens_Tech_July2005web.pdf

Levin, D., Arafeh, S., Lenhart, A., & Rainie, L. (2002). The digital disconnect: The widening gap between internet-savvy students and their schools. Retrieved September 9, 2005, from http://www.pewinternet.org/pdfs/PIP_Schools_Internet_Report.pdf

Lezotte, L. W. (2005). More effective schools: Professional learning communities in action. In R. DuFour, R. Eaker & R. DuFour (Eds.), *On common ground:*

the power of professional learning communities (pp. 177-191). Bloomington, IN: National Educational Service.

Louis, K. S. (1994). Beyond managed change: Rethinking how schools improve. *School Effectiveness and School Improvement, 5*, 2-24.

Louis, K. S., Kruse, S., & Raywid, M. A. (1996). Putting teachers at the center of reform. *NASSP Bulletin, 80*(580), 9-21.

MacGillis, A. (2004, Sept. 21). Law, software fuel new "digital divide". *The Baltimore Sun*.

Marcovitz, D. M. (2000). The roles of computer coordinators in supporting technology in schools. *Journal of Technology and Teacher Education, 8*(3), 259-273.

Marks, H. M., & Louis, K. S. (1997). Does teacher empowerment affect the classroom? The implications of teacher empowerment for instructional practice and student academic performance. *Educational Evaluation and Policy Analysis, 19*(3), 245-275.

McHugh, J. (2005, October). Synching up with the iKid. *Edutopia, 1*(7), 33-35.

Milone, M. (2000). Staff development: Getting it right the first time. *Technology and Learning, 21*(2), 58-61.

Morrison, J. L., & Bowen, D. F. (2006, January). Taking a journey with today's digital kids: An interview with deneen Frazier Bowen, *Innovate Journal of Online Education*: Nova Southeastern University. Retrieved January 10, 2006 from http://www.innovateonline.info/index.php?view=article&id=230&action=article

National Center for Educational Statistics (2000). *Teachers' use of computers and the internet in public schools.* Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

National Center for Educational Statistics (2003). *Technology in schools: Suggestions, tools, and guidelines for assessing technology in elementary and*

secondary education. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

North Central Regional Educational Laboratory (2000). Engauge 21st century skills report. Retrieved April 30, 2005, from http://www.ncrel.org/engauge/skills/skills.htm

Newman, F. M., & Wehlage, G. G. (1995). *Successful school restructuring: A report to the public and educators*. Madison, WI: Center on Organization and Restructuring of Schools.

Oppenheimer, T. (2003). *The flickering mind: The false promise of technology in the classroom and how learning can be saved*. New York: Random House.

Paben, S. (2002). What's in it for the busy leader? *Journal of Staff Development, 23*(1), 24-27.

Reeves, D. (2005). Putting it all together: Standards, assessment, and accountability in successful professional learning communities. In R. DuFour, R. Eaker & R. DuFour (Eds.), *On common ground: The power of professional learning communities* (pp. 44-63). Bloomington, IN: National Educational Service.

Reilly, R. (1999, May/June). The technology coordinator: Curriculum leader or electronic janitor? *Multimedia Schools*: *Information Today*, *6(3),* Retrieved January 11, 2006 from http://www.infotoday.com/MMSchools/MMStocs/may99toc.htm

Saphier, J. (2005). Masters of motivation. In R. DuFour, R. Eaker & R. DuFour (Eds.), *On common ground: The power of professional learning communities* (pp. 85-113). Bloomington, IN: National Educational Service.

Schmoker, M. (2005a). Here and now: Improving teaching and learning. In R. DuFour, R. Eaker & R. DuFour (Eds.), *On common ground: The power of professional learning communities* (pp. xi-xvi). Bloomington, IN: National Educational Service.

Schmoker, M. (2005b). No turning back: The ironclad case for professional learning communities. In R. DuFour, R. Eaker & R. DuFour (Eds.), *On*

common ground: The power of professional learning communities (pp. 135-153). Bloomington, IN: National Educaitonal Service.

Scot, T. (2005). Conditions, processes and consequences of technology integration: Policy to practice. Unpublished doctoral dissertation, University of Virginia.

Spillane, J. P. (2005). Distributed leadership. *The Educational Forum, 69*(2), 143-150.

Stephenson, C. (2004). Leading through advocacy: An interview with ISTE CEO Don Knezek. *Learning & Leading with Technology, 31*(8), 6-9.

Strudler, N. (1995-96). The role of school-based technology coordinators as change agents in elementary school program: A follow-up study. *Journal of Research on Computing in Educational Administration Quarterly, 28*(2), 234-257.

Strudler, N., Falba, C., & Hearrington, D. (2003, June). School-based technology coordinators: Their roles, goals & effectiveness. Retrieved September 8, 2005 from http://coe.nevada.edu/nstrudler/necc03.pdf

Tapscot, D. (2006). Growing up digital: The rise of the net generation. Retrieved January 10, 2006, from http://www.growingupdigital.com/

Vojtek, R. O. B., & Vojtek, B. (1999). Technology standards, *Journal of Staff Development*: National Staff Development Council, 20*(1)*, 67-69.

Wasley, P. A. (1991). *Teachers who lead: The rhetoric of reform and the realities of practice*. New York: Teachers College Press.

Wasser, J., McGillivray, K., & McNamara, E. (1998). Diary of an educational technologist, *Hands On*: TERC, 28*(2),* retrieved June 11, 2005 from http://www.terc.edu/handsonissues/f98/diaries.html

APPENDIX A: LIST OF PARTICIPANTS

School	Principal	CTIP
Elementary School A	Ann	Alice
Elementary School B	Bill	Beth
Elementary School C	Cheryl	Cathy, Connie
Elementary School D	Diana	Debbie
Elementary School E	Eric	Ellie
Middle School F	Fran	Fay
High School G	Gordon	Gary

Rosemont County Administrators	Tammy Peters Tom Byers
V-LIT Project Director	Pat Murphy

APPENDIX B: INTERVIEW GUIDE FOR FIRST INTERVIEW

V-LIT II

Interview Questions for CTIPs and Principals

Elizabeth Langran

Hello, thank you for taking the time to talk with me today. I am doing research on the Rosemont County V-LIT II. Everything that you tell me is confidential and I will not attach your name to any report. If I ask you anything that you do not feel comfortable answering please feel free to tell me that you do not want to answer that question. Do you have any questions for me before we begin?

Name: _____ ID# _____

School:_____ CTIP/Principal *(circle)*

Participation

I want to start by asking you some questions about your participation in V-LIT II.

1) Why did you choose to participate in V-LIT II?

Expectations

2) What would you like to accomplish in V-LIT II?

3) What do you envision changing one year from now?

4) *(For principals):* Have you ever participated in technology training before?
(For CTIPs): Have you ever participated in leadership training before?

Leadership

5) What kind of leadership role does the CTIP have at this school? Is the CTIP part of the school improvement team?

6) What kind of involvement does the principal have with technology decisions? When technology decisions are made, who is involved?

7) Who was involved in the drafting of your current technology plan? How was it drafted? Did it use any research or district plan as a basis, or did it come rather from the input of teachers? How do you communicate your vision for technology here?

8) Are you familiar with the National Educational Technology Standards for Administrators? Have they had any impact on your role as an administrator?

Collaboration

9) What opportunities are there at this school for teachers using technology to share what they know? What opportunities exist for ongoing professional growth? Do you participate in professional development in technology?

10) How often do the CTIP and principal meet?

Current status

11) How is technology currently being used at your school? Do you see areas of improvement?

12) How do you personally make use of technology in your job?

13) If a teacher had a great idea for using technology in his or her classroom, but needed training or hardware/software, what would be the process for getting that teacher what he or she needed? How long might that take?

14) Are the teachers evaluated for their use of technology? Are teachers encouraged to go beyond TSIP certification here?

Environment of responsible risk-taking

15) At this school, how is risk-taking by teachers viewed? How is that culture fostered?

Anything else you would like to add?

APPENDIX C: INTERVIEW GUIDE FOR SECOND INTERVIEW

V-LIT II

Interview Questions for CTIPs and Principals

Elizabeth Langran

1.) While there has been a good deal of talk about technology leadership, there seems to be no real definition for what it is. How would you define technology leadership? What helps you to be a technology leader? What helps others to be technology leaders? What barriers are there? What has influenced your definition of technology leadership?

2.) What is the official role/job description of the CTIP here at the school? Is it different from the reality of what he/she does every day? Is he/she considered a leader, either officially or in practice? Are CTIPs administrators or teachers (NETS-A or NETS-T)? Does this provide any difficulties?

3.) What is the principal's role with technology here at the school (officially and unofficially)?

4.) What is the school's vision for technology? Do you agree? Do you think it's important to write a technology plan? Can I have a copy of yours? Are you taking any measures to ensure that your vision for technology lives on after you leave this school?

5.) Describe your experience so far with V-LIT II. Has it met your expectations/needs? Do you think some things should have been done differently? Do you still have any expectations for January? Has anything changed as a result of V-LIT II?

6.) Has your relationship with the CTIP/principal changed since V-LIT II? How often do you meet? What decisions do you make together? What are made on your own?

7.) What is the relationship between professional learning communities/distributed leadership and V-LIT II?

8.) Can you name a teacher who is making exemplary use of technology for me to observe?

9.) Follow-up questions from January interviews.

Anything else you want to add?

APPENDIX D: TAGLIT SURVEY QUESTIONS

TAGLIT for School Technology Leaders

Part A: Planning and Policies
The Planning Process

1. In terms of involving stakeholders in the technology planning process, our school... 1) does not identify key stakeholders; 2) includes only traditional members of the education community (e.g., faculty, administrators); 3) includes people from five or more of these areas: students, parents, faculty, administrators, support staff, business persons, technology professionals, and community members; 4) includes people from all of these areas: students (at middle and high school), parents, faculty, administrators, support staff, business persons, technology professionals, and community members

2. In terms of reviewing literature and studying innovation, our school... 1) is unaware of current instructional technology research findings, new and emerging technologies, and best practices; 2) is informally aware of some current instructional technology research findings, new and emerging technologies, and best practices, does not formally identify or review them; 3) inconsistently reviews instructional technology research and emerging technologies; 4) keeps abreast of instructional technology research and new and emerging technologies, identifies best practices using all of these methods: case studies, site visits, and collaboration with experts

3. In terms of analyzing the current situation, our school... 1) does not conduct needs analyses, has no data on student and staff technology use and skill levels, does not reference student achievement data, does not assess condition of the facility, has no inventory of available technologies; 2) conducts needs analysis only of students or staff, collects data on some student and staff technology use and skill levels but data are not meaningful or current, assesses condition of some aspects of facility; but data are not meaningful or current, inventories some technology types but data are not accurate or current; 3) conducts needs analyses of students and staff, collects and analyzes some data on student and staff technology use and skill levels, references some related student achievement data, assesses condition of some aspects of facility, inventories some technology types; 4) conducts comprehensive needs analyses of students, staff, and community, collects and analyzes data about student and staff technology skills and how technology is used for teaching and learning, analyzes all related

student achievement data, thoroughly assesses condition of the facility, performs complete inventory of available technologies

4. In terms of assessing the environment, our school... 1) does not assess the strategic direction and political climate of the district, state, and nation; the realities and assumptions with which the school is operating; and the strengths and limitations of the school environment; 2) is uncertain about the strategic direction and political climate of the district, state, and nation; the realities and assumptions with which the school is operating; and the strengths and limitations of the school environment; 3) has a superficial understanding of the strategic direction and political climate of the district, state, and nation; the realities and assumptions with which the school is operating; and the strengths and limitations of the school environment; 4)understands the strategic direction and political climate of the district, state, and nation; the realities and assumptions with which the school is operating; and the strengths and limitations of the school environment

5. In terms of publishing the technology plan, our school... 1) has no written plan; 2) has informal and/or incomplete written plan, either separate from or integrated into a larger planning document; 3) has formal, written plan either separate from or integrated into a larger planning document, has not created or revised plan in the last year; 4) publishes comprehensive, formal plan either separate from or integrated into a larger planning document, has created or revised plan during the past year

6. In terms of gaining support for the technology plan, our school... 1) makes no effort to communicate and gain support for the plan, familiarizes few, if any, staff members with the plan; 2) makes few efforts to communicate and gain support for the plan, familiarizes some staff members with the plan; 3) makes some effort to communicate and gain support for the plan, familiarizes most staff members with the plan; 4) implements a comprehensive process for communicating and gaining support for the plan, familiarizes all staff members with the plan

7. In terms of implementing the technology plan, our school... 1) implements few, if any, action items on time and within budget; 2) implements some action items on time and within budget; 3) implements most action items on time and within budget; 4) implements all action items on time and within budget

8. In terms of continuously improving the technology plan, our school... 1) does

no monitoring or adjusting during implementation; 2) revises plan every three or more years, rarely monitors or adjusts during implementation; 3) revises plan every two years, occasionally monitors and adjusts during implementation, elicits feedback and suggestions, provides delayed, if any, response to feedback; 4) engages in an ongoing planning process, revisits steps in the planning process as needed, elicits feedback and suggestions continuously, provides timely response to feedback

The Planning Document

9. In terms of articulating a vision, our technology plan... 1) does not address vision; 2) does not clearly portray the future impact of technology on education, focuses on technology rather than learner outcomes; 3) clearly portrays the future impact of technology on education in our school, focuses somewhat on learner outcomes; 4) clearly portrays the future impact of technology on education in our school and community, focuses on learner outcomes

10. In terms of describing a mission, our technology plan... 1) does not address mission; 2) does not clearly describe the relationship between vision and mission, does not define learning or characteristics of learners, does not mention desired student benefits and outcomes; 3) imperfectly describes the relationship between vision and mission, imperfectly defines learning and characteristics of learners, mentions desired student benefits and outcomes; 4) describes the purpose of and plans for fulfilling the vision, defines learning and characteristics of learners emphasizes desired student benefits and outcomes

11. In terms of discussing research, our technology plan... 1) does not address research or new technologies; 2) very broadly discusses educational research and new and emerging technologies, does not discuss best practices, does not reference specific resources; 3) discusses educational research, new and emerging technologies, and best practices, but not always clearly or with relevance, uses information from several different resources; 4) presents and references specific, relevant educational research findings, describes new and emerging technologies and specific, relevant best practices, uses information from a wide variety of resources

12. In terms of describing the current situation, our technology plan... 1) does not address current situation; 2) does not mention needs of staff, students, or community, presents current status, based on little or no data, of a few technology related efforts, provides no information about data collection

methods, does not include summary of findings about condition of facility, limits inventory of available technology to computer hardware; 3) presents generalizations, not always based on data, about needs of only staff and students, presents current status, not always based on data, of some technology related efforts, provides no information about data collection methods, includes summary of findings about condition of facility and inventory of available technology 4) presents data-based generalizations about staff, student, and community needs, presents data-based current status of all technology-related efforts, describes data collection methods and instruments used, includes findings about condition of facility and inventory of available technology

13. In terms of defining goals and objectives, our technology plan... 1) does not address goals or objectives; 2) does not include goals that address teaching and learning needs, addresses narrow or unattainable goals, does not mention objectives, does not link goals to research findings and current situation analysis; 3) includes goals that address teaching and learning needs, includes broad, attainable goals, but not how to measure progress toward achieving them, does not show clear relationship between goals and objectives, links some goals and objectives to research findings and current situation analysis, 4) includes goals that address teaching and learning needs, includes broad, attainable and measurable goals and how to measure progress toward achieving them, includes objectives that further define how the goals will be achieved, links goals and objectives to research findings and current situation analysis

14. In terms of presenting action items, our technology plan... 1) does not address action items; 2) does not organize action items well, relates few, if any, action items to goals and objectives, presents few, if any, timeframes, persons responsible, estimated costs, or funding sources; 3) organizes action items into phases, but does not identify major milestones, relates some action items specifically to goals and objectives, presents some action items with clearly defined tasks, timeframes, persons responsible, estimated costs, and funding source; 4) organizes action items into phases and identifies major milestones, relates each action item to specific goals and objectives, presents all action items with clearly defined tasks, timeframes, persons responsible, estimated costs and funding sources

15. In terms of addressing facilities (e.g. space, power), our technology plan… 1) does not address facilities; 2) limits consideration to housing and/or powering technology equipment, does not address specific facilities issues; 3) partially addresses impact on facilities, addresses specific facilities issues with

recommended solutions; but solutions are not part of implementation plan 4) addresses impact on facilities, addresses the configuration of buildings and classrooms to support teaching and learning strategies, if appropriate, recommends solutions as part of implementation plan

16.In terms of addressing infrastructure and standards (e.g., LAN, WAN, Internet access, video distribution, satellite delivery, telecommunications system), our technology plan... 1) does not address infrastructure or standards; 2) is based on inaccurate and/or outdated underlying infrastructure design, is based on inaccurate or outdated equipment and software standards; 3) is based on unclear and/or incomplete underlying infrastructure, is based on unclear and/or incomplete equipment and software standards; 4) addresses comprehensive underlying infrastructure design, states clear equipment and software standards, including required functionality, specifications, and capacities

17. In terms of identifying technical support and maintenance needs, our technology plan... 1) does not address technical support and maintenance; 2) identifies few, if any, support and maintenance needs, includes an unclear process to support technical aspects of plan implementation (such as interoperability and technology deployment), does not address equipment maintenance; 3) identifies most support and maintenance needs, but does not include a cost analysis, includes informal process to support technical aspects of plan implementation (such as interoperability and technology deployment), addresses equipment maintenance but not how it will be funded; 4) identifies support and maintenance needs and includes a cost analysis, includes specific processes to support technical aspects of plan implementation (such as interoperability and technology deployment), addresses equipment maintenance and how it will be funded

18. In terms of assuring high-quality professional development, our technology plan... 1) does not address professional development; 2) focuses entirely in one-time professional development events, does not address long-term support, focuses on skill development; 3) focuses primarily on one-time professional development events, does not clearly address long-term support, focuses primarily on skill development, includes some attention to topics such as curriculum integration, instructional practices and alternative assessment techniques; 4) favors on-going professional development over one-time events, recommends comprehensive long-term support, focuses primarily on topics such as curriculum integration, instructional practices and alternative assessment

techniques

19. In terms of addressing funding, our technology plan... 1) does not address funding sources; 2) does not identify specific funding sources, does not allocate funds in budget, includes available funds that do not cover estimated cost of implementation, does not mention future funding sources; 3) identifies specific funding sources, allocates funds in budget but not in detail, discusses future funding sources that do not appear substantial enough to support long-term goals; 4) describes specific funding sources, allocates budget funds in detail, discusses future funding sources and shows evidence of sustainability

20. In terms of assessment and evaluation, our technology plan... 1) does not address assessment and evaluation; 2) assesses/evaluates only a few critical plan components, does not clearly relate assessment/evaluation to objectives, relegates assessment/evaluation to the end of the implementation process; 3) does not assess/evaluate all critical plan components, inconsistently relates assessment/evaluation to objectives, includes assessment/evaluation at some milestones in the implementation process; 4) describes comprehensive design that is clearly tied to plan's goals and objectives, includes appropriate use of both qualitative and quantitative measures

21. In terms of aligning the plan with other initiatives, our technology plan... 1) does not address other standards, programs, or initiatives; 2) aligns few plan components with district, state, and national standards, connects few plan components to school curriculum, aligns few plan components with other reform efforts; 3) aligns some plan components with district, state, and national standards, connects some plan components to school curriculum, aligns some plan components with other reform efforts; 4) aligns plan components with district, state, and national standards, connects plan components to overall school curriculum and programs, aligns plan components with other reform efforts

22. In terms of addressing environmental strengths and limitations, our technology plan... 1) does not address strengths and limitations of the environment; 2) identifies environmental strengths and limitations but unclearly and incompletely, contains few components that take into consideration identified strengths and limitations; 3) identifies environmental strengths and limitations but does not relate them to overall school environment, contains some components that take into consideration identified strengths and limitations 4) identifies environmental strengths and limitations and relates them to the

overall school environment, considers strengths and limitations in the design of the goal and objectives

Technology Policies

What is the current status of your school policy with regard to...
1 we don't have this policy
2 we have an informal policy
3 we have a formal policy and it is partially operational
4 we have a formal policy and its fully operational

23. the equitability of student accessibility to technology?
24. acceptable uses of technology by students?
25. acceptable uses of technology by staff?
26. discipline for technology-related offenses?
27. assessment of technology competencies of students?
28. assessment of technology competencies of staff?
29. hardware and software standards (e.g., platform, operating system, desktop configuration, software version, etc.)?

Technology-Related Community Connections

Does your school involve the community (e.g., parents, businesses, higher education) in your instructional technology program by...
1 no
2 yes, somewhat
3 yes, for the most part
4 yes, completely

30. inviting them to participate in the decision-making process as it relates to technology?

31. making your school technology resources and/or services available to them?

32. developing mutually beneficial school-business partnerships?

33. discipline for technology-related offenses?

Technology Resources - Hardware

Think about technology equipment in your school that is used exclusively for instructional purposes. How many of each of the following do you have?

Students to 1 device:

34. All instructional computers
35. Computers with CD-ROM drive and sound card
36. Network-connected computers
37. Computers with Internet access
38. Digital cameras

Ratio of computers to 1 device:

39. Printers
40. Network-connected printers
41. Projection devices
42. Scanners

APPENDIX E: TAGLIT SURVEY ANSWERS

	School A CTIP	School A principal	School B CTIP	School B principal	School F CTIP	School F principal	School G CTIP	School G principal
1	2	2	2	2	2	2	3	2
2	3	2	2	3	2	3	2	3
3	2	2	2	2	2	3	3	2
4	3	3	2	3	3	3	3	2
5	2	1	1	1	1	3	4	2
6	1	1	2	1	1	3	3	2
7	1	1	2	1	2	3	2	3
8	1	1	1	1	1	4	4	4
9	1	1	2	1	1	3	3	1
10	1	1	1	1	1	3	3	2
11	1	1	1	1	1	3	3	1
12	1	1	1	1	2	3	3	1
13	1	1	1	1	1	3	3	1
14	1	1	2	1	1	3	3	2
15	1	1	1	1	1	4	2	2
16	1	1	1	1	1	3	1	3
17	1	1	1	1	1	3	3	3
18	1	1	3	1	1	4	3	2
19	1	1	1	1	1	3	3	2
20	1	1	1	1	1	3	3	2
21	1	1	3	1	1	3	3	3
22	1	1	1	1	1	3	2	1
23	1	2	2	2	2	4	3	3
24	3	4	4	4	4	4	4	4
25	2	4	3	2	2	4	4	4
26	1	4	1	4	4	4	4	3
27	1	2	2	3	1	1	1	1
28	4	4	4	4	3	4	4	3
29	3	4	1	2	4	4	4	3
30	1	1	1	1	1	1	2	1
31	2	2	2	1	2	1	2	1
32	2	2	1	1	1	1	1	1
33	1	1	2	1	4	1	2	1
34	4	4	3	3	3	5	3	4

35	4	4	3	3	3	5	3	4
36	4	4	3	3	3	5	3	4
37	4	4	3	3	3	5	3	4
38	50	50	100	49	233	70	238	83
39	10	10	16	11	19	19	16	6
40	18	18	16	11	21	19	18	8
41	15	15	16	13	38	45	39	4
42	75	75	81	80	64	45	62	40

APPENDIX F: ONLINE TEACHER SURVEY QUESTIONS

Technology Leadership
University of Virginia Teacher Survey

This survey is part of a doctoral dissertation research on technology leadership. The purpose of this survey is to find out teachers' opinions about technology leadership. Participation in this survey is completely voluntary, and your answers are anonymous. Thank you for taking time to answer these questions. It should take approximately 5 minutes of your time.

Contacts:
Elizabeth Langran
Dr. Glen Bull

Please indicate the school where you teach:

1. Please identify two people that you feel are technology leaders. They can be in your school or working elsewhere in the Rosemont County School Division.

a. Name & job title:

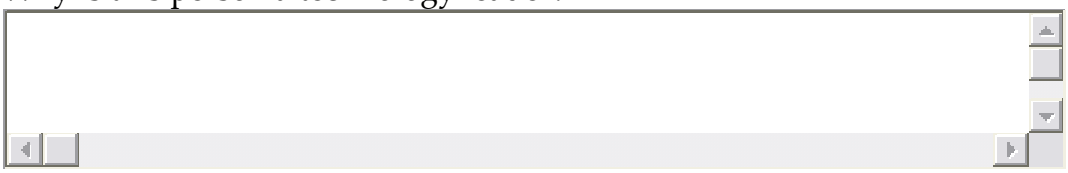
Name of the school or office where he/she works:

Why is this person a technology leader?

b.Name & job title:

Name of the school or office where he/she works:

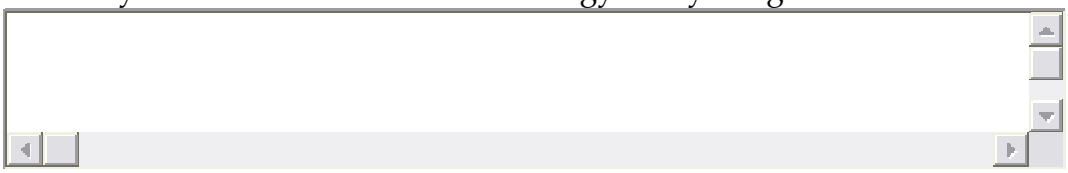
Why is this person a technology leader?



2. Does your school have a technology plan?

- ☐ yes
- ☐ no
- ☐ unsure

What is your school's vision for technology? Do you agree with this vision?



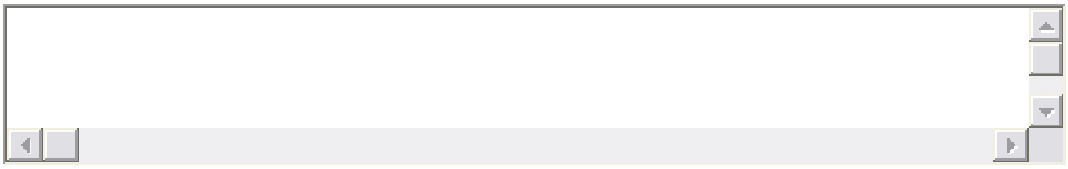
3. Is there sufficient structure (i.e. time built into your schedule, guidelines) to collaborate with other
teachers?

- ☐ yes
- ☐ somewhat
- ☐ no

Are teachers held accountable for collaboration?

- ☐ yes
- ☐ somewhat
- ☐ no

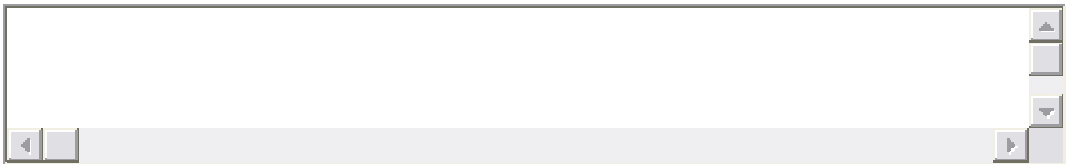
Additional comments:



4. What percentage of the teachers at your school are willing to take risks and try new and innovative teaching approaches?

- ☐ 100%
- ☐ 90%
- ☐ 75%
- ☐ 50%
- ☐ 25%
- ☐ Less than 25%

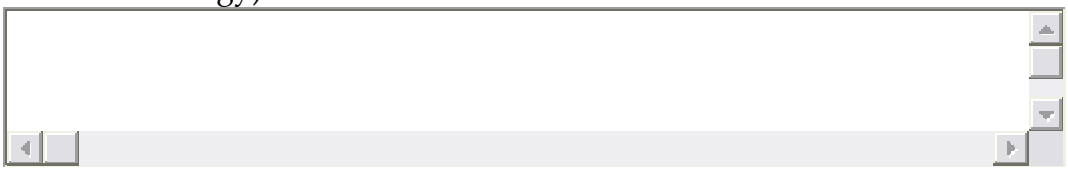
Additional comments:



5. To what degree are teachers at your school expected to use technology while teaching?

- ☐ Highly expected to use technology
- ☐ Somewhat expected to use technology
- ☐ Not expected to use technology

Additional comments (please feel free to comment on *how* teachers are expected to use technology):



Thank you for your valuable participation in this survey.

Submit

APPENDIX G: ROSEMONT COUNTY
CURRICULUM AND TECHNOLOGY INTEGRATION PARTNER JOB DESCRIPTION

The Curriculum and Technology Integration Partner performs instructional duties at the assigned school level in appropriate academic disciplines. Essential functions include, but are not limited to, the following:

* Assists staff in the ongoing development of knowledge, skills, and understanding of technology systems, resources, and services that are aligned with district and state technology plans;
* Assists teachers in meeting state and local technology standards for instructional personnel;
* Assists teachers in obtaining, learning, and using educational technology resources to improve their instructional effectiveness;
* Assists with the design, development, and implementation of staff development opportunities within assigned schools and at the division-level;
* Assists with the development of model lesson plans;
* Collaborates regularly with Library Media Specialist and teachers to support the integration of technology in the classroom;
* Collaborates with school administrators, school-based leadership teams and all staff to utilize available technology to improve teaching, learning and student outcomes;
* Conducts workshops for instructional staff on uses of technology;
* Demonstrates continual growth in technology knowledge and skills and general educational research to stay abreast of current and emerging technologies while modeling and supporting best practices;
* Establishes an environment that encourages creative and independent use of instructional technology throughout the school

APPENDIX H: TECHNOLOGY LEADERSHIP AS DEFINED BY V-LIT II PARTICIPANTS

Elementary School A
CTIP Response: ***Leaders build leadership in others, and "think like a teacher."*** I'm the one that tries new things in different ways, and then shares it out. I'm also the one that works behind the scenes to make someone else look good, whenever possible, and that's the scaffolding that I think a leader has to do to make other people rise. … To be an effective technology leader, you've got to be a really effective teacher. And you've got to think like a teacher always because my job I feel like it is to encourage them to use technology, to use it to work smart, and there's a lot of people still not working smart, and so I see teachers sometimes teaching the same unit that they taught for a couple of years, but they look like they're teaching it for the first time year after year because they don't refine, they don't use technology to help them save and organize and that kind of thing. We're getting better, so I think you've really got to be a good teacher, and you have to think like a teacher to be a technology leader in a school anyway.
Principal Response: ***A leader has a vision for how technology advances curriculum and learning.*** There's all kinds of leadership, there's technology leadership, there's reading leadership, there's math instruction leadership, so it's not an issue really, probably of technology leadership but just leadership in general, so if you talk about leadership in general, you talk about what is the leader's vision for the school, and then how's technology fit into that… and understanding how technology advances curriculum, and learning. So I think it's a matter of just leadership in general, and so how well you lead any part of your school… I liken it almost to a pencil, you know, it's a tool for learning, and that's how it always should be seen and so you don't want to teach it for its own sake.
Elementary School B
CTIP Response: ***A technology leader learns about the technology and then supports teachers to envision and use it as a tool.*** I think the first thing, what popped into my head is that it takes a lot of time, because you can't really lead people in something unless you really, really know what you're talking about, and because technology's so fluid, it takes a lot of practice and a lot of time to get familiar enough with it so that you can then show other people how to get to the same place… I think it's really trying to get people to see that technology isn't another thing, that it's a tool, not a burden, and I guess I've just been trying to fit it in where it seems appropriate and offering to stand next to people so they don't freak out while they're doing it, but I guess it's like any other kind of training people to do something, just have to be willing

and have the ability to take the time to do it.
Principal Response: ***Technology leaders develop teacher instruction by integrating technology.*** Technology leadership sounds like technology for the sake of technology rather than enhancing instruction, so those are the things that come to mind. I have a problem, just the way that sounds, it doesn't sound good to me. It sounds like it could be said a better way. Something along the lines of instructional technology and integration, and then leadership. … [That] would target the notion of developing teacher instruction in the building by integrating technology and how do you do that and who takes a leadership role in developing that.
Elementary School C
CTIP Response: ***Administrators are knowledgeable, support teachers in multiple ways, and model technology use. CTIPs relate to and communicate with teachers.*** First of all you have to be knowledgeable, what's out there and what other schools are doing, what works, and look at models of schools that integrate technology. You need to be supportive, staff development, and giving teachers time, subs or time away from classroom, to work on that. You make sure they have the right kind of tools, not just the computers, but the software, and the people around it to support us. They really need to model it too. …they need to be aware of all of this and they need to model it, and so when they're running a staff meeting and they're using SMART Board or Elmo or something it's just kind of not a big deal, they're just using the tool. And teachers I think they know that, because if somebody's telling you to use technology and they don't know how to send email, that's the wrong message. …And then the CTIP part of that, I thought of two words, relate and communicate. It helps having been a teacher, so I can relate to teachers, I know how busy they are, and I don't want to overwhelm them… so I can relate to them, and communicate, and that means listening more than talking. I go to their team meetings … and I listen, I look at their curriculum …But communication, that's probably the biggest thing, and just listening to what their needs are. There are some teachers that are very eager and they come to me and they want to know everything, and there are other teachers that are reluctant and you still have to get to them, and that's just finding one little hook, like check this out, you really have to know the teacher.
Principal Response: ***Leaders move the process of hardware and software acquisition along.*** Well, technology leadership. I must talk specifically in this building. I'm in charge of technology. When I arrived there was no wireless, they had started to do, but I arrived and said I can't function without wireless. That was very high

on the priority list. I'm very much about getting things moving, just that's who I am, I set a goal for myself and say I want this, this and this done by this time, and just do everything I can.

Elementary School D

CTIP Response: ***Technology leaders need to stay informed to support and "gently push" teachers to use technology.***

I think it has to do with, I work with everybody in the school, so I feel like because I have to work with them, and I mean cover certain things, and meet certain needs, and help them in curriculum, I feel like I have to be a leader in that field in order to stay ahead and help them …. So I think it has to do with trying to stay on top of what's going on in the education field, and pull technology into that at the same time without getting overwhelmed, because I really feel that sometimes there's just so much out there that the new stuff that's coming down either way with technology that I think it's real easy for people to lose their focus because there's so much, there's too much. …One [teacher] showed interest in [the SMART Board] at the end of last year and I told her that just to let me know what I can do to help her with that, but it just kind of didn't go anywhere from there, so that might be where the leadership thing comes in too is where we just need to push a little bit harder, not push, but do it in a gentle way, gently push.

Principal Response: ***Leaders have a responsibility to model technology use and to keep teachers focused on using technology to create 21st century-appropriate schools.***

I have a responsibility to model, that I'm also not the expert in all things but that I'm willing to learn and put myself out there, that I recognize that things are changing so fast that to keep up with it all we could all easily get behind really quickly. I think that I have a responsibility to model where I am with that and what I'm trying to learn how to do…I think I have to give people this kind of framework to think off of, to tie it in, so that they value it not as a technology but that they see it as learning. We're having conversations around the fact that we're not educating children for our past, but we're educating them for their future.…The smaller children here, millennial kids, they really do come with a totally different kind of background knowledge than any of us really had, So part of technology or instructional leadership has to be about always keeping that in the forefront…Schools are the one place we're structured in so many ways based on a traditional model because we've been based this way for ever and all of a sudden we've been asked to change and we don't know how to do that fast enough and so that's another role of instructional leadership is to recognize that it's there, to challenge those things, to try to keep people in the loop as much as you can, and to provide that kind of information to our greater parent

community.
Elementary School E
CTIP Response: ***Technology leaders are tuned into current technology trends for practical usage and curriculum integration and lead by example.*** What it made me think of is people who have their radars really tuned to what's current, what really augments curriculum, practical usage, curricular integration, and, the leadership part, that's the tricky part, because I would suspect that some people think I'm a technology leader but that's only based on what they perceive as my knowledge base, and I don't know that I've necessarily perceived myself as a leader, other than I lead by example.
Principal Response: ***Administrators rely on CTIPs as technology leaders to demonstrate skilled use of instructional uses of technology.*** When I think of technology leadership, I think of in my school…my CTIP and who is very capable, not only as a troubleshooter and user of software and that, but instructionally, because in a school, technology leadership I see has to do with instruction and as an administrator I don't have the opportunities to be involved in instruction as much, so I think the dependency on a teacher who's very skilled at it using her skills to teach through technology, or teach technology, I think that would be my definition of technology leadership.
Middle School F
CTIP Response: ***While the principal and teachers can play leadership roles, it is the CTIP who facilitates technology integration.*** There are teachers in the school who could play leadership roles… All the research shows that the principal is the ultimate instructional leader. Fran's really comfortable with the technology herself, and used it when she was a teacher, but I don't know that her job is to push necessarily, she's very supportive of it, I guess I'm the person who is in the school… to facilitate that integration and making the resources available in a really easy way for teachers so that they're getting into their classes. And they're doing some of the more project-based constructivist thinking…more hands-on.
Principal Response: ***Technology leadership is a form of leading teachers to try new ways of engaging students. Technology leaders model and provide the support of a CTIP.*** I guess I think all of leadership is modeling … but that doesn't mean it's happening in the classroom still. I think the leadership's going to come in and having [the CTIP] available to teachers and it's also going to be in trying to support teachers in learning. I don't know that I think that there is such a thing as technology leadership. I just think there's leadership, and then technology's going to be the other tool in a teacher's toolbox or an administrator's toolbox as a

way to reach children. … I guess my definition of technology leadership would be it doesn't really exist that way… It just exists as a form of leading, and leading teachers to not be afraid to try new things to find ways to get kids connected because the real thing is getting kids engaged, and technology helps kids get engaged…What I try to do is bridge the gap [between technology users and non-users], and also provide those resources.
High School G
CTIP Response: ***A technology leader is a visionary who sets goals and then prepares, trains, and supports staff during implementation of the goals.*** I think it's being a visionary … I have a pretty clear vision of what it can look like so I think just driving that kind of setting goals for each year and it's hard to make change in an environment where there's 150 teachers and with some resistance to just doing things like taking attendance using the computer… I think setting those goals, preparing the staff well for its implementation and training and just being there for support, but at the same time not overly supportive, at some time you have to push them off and say ok sink or swim. I think it's just recognizing the potential in knowing where we are and where we want to go and then taking advantage of those opportunities, so say a teacher's doing something a certain way, not like you should be doing it this way or have you ever thought of maybe trying it that… Slowly grabbing at them and getting more technology use out there. That's what I look at as a leader, taking the initiative.
Principal Response: ***Visionary leaders of the future allow creativity as part of the change process of education.*** I think that the educational form, if you really want look about a vision, I don't think we're going to do business like we're doing…What the leader does is the leader steps on all that creativity as a result we will continue to do it the way we were doing it because that's how I was taught to do it. …I think the real visionary educators of the future are going to let good practice become creative and therefore it will grow and it will get better.
Rosemont County administrator Tammy Peters
A technology leader is someone who has a clear vision for learning and is both skeptical and inventive in how technology can support that. One of the things I think a technology leader is not is someone who has this, 'If it's technology it must be good, therefore I'm going to expect everybody to do it without having any sense of return on investment.' Every teacher will have a webpage is an example of that. Without having a clear vision of what the purpose of that webpage is to be, who the audience for it is, that leads to some operational stuff, how often should it be updated, what supports are in place to

update it… A technology leader is someone who has a clear vision for learning and is both skeptical and inventive in how technology can support that. There's a healthy skepticism there …maybe it's a groundedness almost, because if my choice is to support every teacher having a webpage, and I don't have a clear vision for what that webpage should do to improve student learning, but that's what we're going to do, that's my goal to the superintendent, and the end of the year I'm going to be able to say I met that goal. And what I ultimately do is pull my CTIP from planning Framework units with teachers in order to make that happen… So it's the leader that has a clear vision for learning and can evaluate and plan towards set up structures so that technology can support that vision. But it's got to be about learning. It's got to be about learning and the role that technology could play in that. It's not just about having the greatest stuff, or the highest numbers, or the lowest numbers, or whatever… It's not about that, it's about how we are leveraging everything possible to give kids every possible shot at learning what they need to learn.

V-LIT Project Director Pat Murphy

A technology leader is an educational leader who recognizes and respects the tools that 21st century learners use, who surrounds himself or herself with people who are experts in that field, and who enables technology-enhanced instruction to happen.

Technology leadership, in the educational senses, simply means being a leader of today's learners and teachers. It isn't about being a techno-guru or a gadget-whiz, it's about recognizing and respecting the tools that 21st century learners use, and ensuring those are incorporated to the best of their abilities in classroom instruction. The people who are pushing technology leadership I think mean it to be an educational leader who's savvy with technology. I think people outside that field might think it means I've got to be really up on all the gadgets and I've got to know the latest versions of hardware and I don't think that's the definition that most of us are working with. I think most of us are working with the definition of being an educational leader who is respectful of what technology does in the educational realm… If I'm a technology leader, I know enough about it to know that it's an important aspect of learning and I respect it enough to know that all the students are using technology tools outside school, and that's their life, basically is how they interact with tons of stuff is through technology, so I think being a technology leader means leader of education, and I respect the technology piece of it, and I surround myself with people who are experts in that field, and make sure I enable technology enhanced instruction to happen.