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Teachers, teamwork, and technology: an introspective look at leadership and change

Robert Rossi

TEACHERS, TEAMWORK, AND TECHNOLOGY: AN INTROSPECTIVE LOOK AT LEADERSHIP AND CHANGE

by
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Dedication

To My Friends

The last three years required a great deal of time away from the people whom I love the most, including my dear friends. Thank you for your encouragement and patience during this process. Your friendship means the world to me and I am looking forward to reconnecting soon.

To My Family: Dad, Mom, and Ronnie

Thank you for your inspiration, support, and most importantly, your love. I would not have been able to attain this level of accomplishment without the appropriate role models. You have always supported my pursuits, even when I was uncertain of what I wanted out of life. Your patience and encouragement has paid off!

To My Three Boys

Ryan, Kyle, and Dylan, you inspire me to be a better teacher, father, and friend. You are the true "purpose" of my study. Remember, you can do anything you want to do, be anything you want to be, and accomplish anything you want to accomplish. You will always have my unwavering support and love.

To My Wife: Colleen Haney Rossi

You are my best friend and partner in life. Your cheerful innocence and unfaltering enthusiasm for life drew me to you when we were in high school and those same qualities still captivate me twenty-six years later. You already have all of the characteristics of the teacher, parent, and individual I aspire to be. I love you tons.

Acknowledgements

I would like to thank my dissertation chairperson, Dr. Christy Faison. Your support, friendship, and guidance throughout this endeavor were invaluable. Your energy and enthusiasm were instrumental in making our journey together an enjoyable accomplishment (as promised). Thank you.

I would also like to thank Dr. Richard Gochnauer and Dr. Herb Simmerman for their efforts with this dissertation. Your friendship, as well as your feedback, provided valuable insights for me, both professionally and personally.

To those who participated in this action research project, specifically Barb Dunleavy and the staff of "Holly" Elementary School, I would like to thank you for taking the time to be of assistance to a fellow colleague. Your reflections about educational technology integration were invaluable to my study. It is my hope to use the skills and knowledge I have gained to give back to our school and our community.

Thank you to the "Huntingon" Township School District, specifically to Bruce Taylor and the district technology specialists. An initial barrier to this study was trying to find a way to improve upon the unblemished, existing model for technology integration in our school district. Hopefully, I was able to make my fellow "techies" proud.

I would also like to express my deepest appreciation to Robie Bloom and Rea Snyder. You were subjected to reading these pages more times than was necessary, and you did it without question or complaint. Thank you for your time, professionalism, patience, and most of all, your friendship.

To my cohort: Many of the lessons I have learned these past three years happened both inside and outside of the classroom. I am so thankful that we lived and learned

those experiences together. Thank you for the emotional, academic, and sometimes comedic support. I would not have made it through this without the help of some good friends -- you know who you are. For those of you still in the trenches, keep “pounding the rock.”

Abstract

Robert C. Rossi
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Teacher convictions and doubts about the process of integrating technology into instruction have a major influence on the degree to which the teacher applies technology in the classroom. Teacher paradigms, in addition to federal, state, and local policies, can create barriers that inhibit the incorporation of technology-based initiatives. The purpose of this action research study was to create/design a process of technology integration that takes into account the needs of all stakeholders by identifying the pedagogical beliefs of elementary school teachers with regard to the implementation of technology in their classrooms. The research was conducted using a qualitative methodology approach within the transcendental phenomenology framework. Data was gathered using qualitative open-ended surveys, one-on-one interviews, and observations to ascertain teacher opinions with regard to the phenomenon of technology integration. Findings indicated that both intrinsic influences (teacher beliefs, teacher efficacy) and extrinsic influences (time, support, access, training) exist that inhibit the successful implementation of technology-based initiatives. Additionally, intrinsic and extrinsic influences inhibiting technology integration are less prevalent when both the teacher and the Technology Specialist are equally engaged and involved in the planning, development, and execution of technology infused projects. Furthermore, findings indicated several factors that, if implemented, could foster a successful, collaborative

environment for technology integration; such factors included creating additional time for planning and development, increasing the involvement of teachers in district planning processes, and clearly defining roles and responsibilities of all stakeholders connected with the process of technology integration.

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Chapter 1: Introduction

Progress, evolution, and success are impossible without change. When discussing organizational change, the essential question still remains: How do we combine "meaning" and "action" to attain continuous development (Fullan, 2007)? In other words: How do we transform theory into practice? Educators talk about technology usage in the classroom as if they have a common definition regarding technology and how technology is integrated into instruction (Becker & Ravitz, 2001). In reality, the composition of technology and its functionality is quite different for teachers of differing ages and backgrounds, teachers in different subject areas and grade levels, and teachers with different pedagogies.

The amount of technology introduced to schools and classrooms has grown significantly in the past twenty years. However, educators and researchers still report that integrating technology into classroom instruction is not easily accomplished (Department of Education, 2009). Although the ingredients for successful technology integration seem to be in place, including access to technology (Becker & Ravitz, 2001; Ertmer, 2005; Watson, 2006) and improved professional development training for teachers (Cole, Simkins, & Penuel, 2002; Strehle, Whatley, Kurz, & Hausfather, 2001), the integration of technology into the curriculum is still surprisingly low (Cuban, Kirkpatrick, & Peck, 2001).

According to Ertmer (2005), technology serves as an important instrument in schools and classrooms in which teachers: a) have the proper access, b) are sufficiently prepared, c) have autonomy in curriculum instruction and practices, and d) hold personal beliefs that are associated with the constructivist pedagogy. Recent reports suggest that,

while this environment does not exist for teachers in all schools, things are starting to change.

Barriers for successful technology integration have been identified through qualitative analysis and observational work (Cuban, et al. 2001; Strehle, et al., 2001), through quantitative surveys and analysis (Becker & Ravitz, 2001; Wood, Mueller, Willoughby, Specht, Deyoung, 2005), and through numerous mixed method research approaches (Dexter, Anderson, and Becker, 1999; Judson, 2006; Sugar, 2005). These studies suggest that external and internal factors influence the ability of teachers to effectively integrate technology. Barriers include the pedagogical beliefs of the teachers with regard to technology, inability to work with peers, context and access issues, support issues akin to the lack of professional training and technical support, and computer and hardware problems such as technical issues and malfunctions.

Background and Study Context

Huntington Township School District (HTSD), a pseudonym, is a suburban community district located approximately twenty miles east of Philadelphia. The school district offers four kindergarten through fifth grade elementary schools and one sixth through eighth grade middle school. Approximately 3400 students are enrolled at Huntington, and over 300 teachers are employed. The administration consists of: one superintendent, two assistant superintendents, five principals, five assistant principals, and numerous directors.

Holly Elementary School, also a pseudonym, is a kindergarten through fifth grade school in the HTSD. At the time of the study, Holly Elementary School served 425 students and employees, 44 certified staff members, four instructional associates, two

secretaries, and one administrator. Of the 44 certified staff members, the focus of the study was on the classroom teachers due to their increased exposure to, and experience with, technology in the classroom. The participants in the research study included 20 elementary school teachers ranging from kindergarten to fifth grade. Nineteen of the participating teachers were female and one was male, all with varying levels of teaching experience.

Huntington Township School District provides each of its schools with a Technology Specialist. According to the district's website, the Technology Specialist is:

> …a resource person with responsibilities in many areas. Those employed in this capacity have backgrounds as classroom teachers with varying degrees of technical experience. The role (and job description) for the Technology Specialist is continuously evolving, moving gradually away from that of a lead provider of instruction to curriculum resource person and technology integration facilitator. Technology Specialist responsibilities include information technology literacy instruction, academic curriculum-technology integration planning and implementation, staff development, building-level budgeting and purchasing, as well as maintenance and technical support for computer hardware, software, network administration, website and electronic messaging systems management, as well as administrative data systems support (HTSD, 2010).

The researcher has acted as Holly Elementary School's Technology Specialist since November of 2000. In addition to the aforementioned duties and responsibilities, the Technology Specialist is also charged with the responsibility of improving teacher practices and student learning through the implementation of educational technology.

At the beginning of the study, Holly Elementary School's technology resources included computers with Internet connectivity in each classroom. Kindergarten through second grade classrooms each housed two computers, while third, fourth, and fifth grade classrooms each had five computers. All classrooms were equipped with a SMART Board (Interactive Whiteboard) and a liquid crystal display (LCD) projector. Fourth and fifth grade teachers shared two laptop carts; each cart contained 20 laptop computers. Third grade teachers shared a laptop cart containing 24 Dell Netbook computers. Grades K-5 were scheduled to use the computer lab every fourth week. A full-time Technology Specialist was available to troubleshoot technical issues as they arose and collaborated with classroom teachers during scheduled lab visits. When not in use, the computer lab could be scheduled by teachers on a first come, first served basis. As Holly Elementary School's Technology Specialist, The researcher witnessed varying degrees of technology awareness by the staff and the students, both at the time of the study and in the present day.

According to HTSD's Professional Development Plan, HTSD provides numerous formal and informal professional development opportunities. These professional development opportunities offer staff members time to collaborate, to review curriculum, and to explore new curriculum and initiatives. Most of these training opportunities are provided by peers and many of them are focused on technology initiatives. Recent technology-based professional development training sessions included:

- EnVision math curriculum training
- SMARTBoard training
- SchoolWires web site training

- Genesis online gradebook training
- Microsoft Office 2007 training

As with most professional development training workshops, time, scheduling, and budget constraints present challenges to providing future professional development opportunities. Due to these aforementioned barriers, time to dialogue about questions that arise during or after the implementation of new programs is rarely provided (HTSD, 2010).

Research Statement

According to Becker (1994) and Ertmer (1999), even advanced technology users will encounter barriers. As indicated above, the quantity and nature of these obstacles are difficult to predict; however, it is inevitable that teachers will encounter a wide range of barriers while utilizing technology. By acknowledging and anticipating various difficulties, teachers can begin to develop the strategies and skills to overcome such barriers. Ertmer (1999) identifies two groups of obstacles that affect a teacher's ability to integrate technology in the classroom - namely external or first order factors (e.g. equipment, time, training, and support) and internal or second order factors (e.g. teachers' pedagogical beliefs and teacher efficacy). This study examines first and second order obstacles to successful technology integration, identifies how classroom teachers cope with these extrinsic and intrinsic barriers, and explains how the aforementioned barriers affect technology integration in the HTSD. Finally, this study will provide recommendations for developing a process of technology integration that enables teachers to overcome these obstacles at the local school level.

A peripheral purpose of this study is to understand the researcher's role as a teacher and a leader, while creating/designing a process of technology integration that takes into account the needs of all stakeholders by identifying teacher perceptions about technology integration, the expectations of the HTSD, and the role of the Technology Specialist. By examining the relationship of first and second order barriers to technology integration, this study explores how teachers use technology, identifies teacher perceptions regarding the role of technology in the classroom, and explores teacher beliefs about effective classroom practice with regard to technology integration. To reveal the values and beliefs that support or hinder the effective use of technology in the classroom, the primary research questions focus on *how* teachers are using technology in their classrooms and *why* they are using it in this way.

This study also addresses the following questions related to the research:

- What are the supports and perceived barriers to technology integration?
- Will staff collaboration and access to technology enhance technology integration?

Overview of the Methodology

Researchers may utilize numerous data collection and research methodologies in the development and execution of a research project. Ultimately, the goals of the research will dictate the appropriate methodologies to use. What research questions are being investigated help to narrow the specific methodologies for both aspiring and seasoned researchers. For this research project, two methodologies were utilized. The data collection process utilized a qualitative research approach. The researcher used a phenomenological theory approach in interpreting collected data during data analysis.

A qualitative, or constructivist, approach to data collection attempted to understand the phenomenon from the views of the participants in the study (Creswell, 2009; Glesne, 2006). Observing participants in the study was an essential element in qualitative data collection. The qualitative theoretical underpinning of the research project was the phenomenological approach. The phenomenological approach attempted to understand patterns of relationships and experiences of individuals in order to explain the phenomenon (Bogdan & Biklen, 2007; Creswell, 2009).

Limitations of the Study

For the past 10 years, the researcher has worked as the Technology Specialist at Holly Elementary School. During that time the duties and responsibilities of the Technology Specialist have changed. In November of 2000, the primary responsibility of the Technology Specialist was to assist the classroom teacher with the integration of technology into the content areas. For example, if the teacher was instructing the students on how to represent data in graph form, the job of the Technology Specialist might be to show the students how to analyze and interpret their data by creating a graph using Microsoft Excel. The position was one of co-teacher or assistant to the classroom teacher.

As the years progressed and the technology being introduced into the schools started to evolve, the job responsibilities of the Technology Specialist also evolved. At the time of this study, the responsibility of the Technology Specialist has shifted from instruction, assistance, and technology integration to purchasing, technology maintenance and assistance, and instruction. At the same time, the duties and responsibilities of the classroom teacher have also changed. Additional tasks, as well as new initiatives, have

placed more restraints on the already demanding schedules of classroom teachers. This paradigm shift has caused the classroom teacher to take on additional responsibilities with regard to technology integration in the classroom and the computer lab.

For the most part, colleagues consider the researcher an advocate, a teacher, and a friend, even though they may not completely understand the role of the Technology Specialist. While in the planning process, one of the anticipated limitations to this study was the researcher's ability to overcome the past and present typecasts that encompass the Technology Specialist position. Fullan (2007) suggests that "when relationships develop, trust increases, as do other measures of social capital and social cohesion" (p.52). The validity of the data collected for this study will ultimately rely on the existing relationships the researcher has formed with the staff and how the researcher continued to nurture those relationships as a participant observer throughout the study. By using a phenomenological approach (Creswell, 2009), this study will examine emerging themes of technology integration while minimizing the researcher's subjectivity as a participant observer.

Conclusion

Chapter 1 summarizes the intent and significance of technology integration in an educational setting. This study examines the barriers that may impede successful technology integration and investigates how teachers deal with these extrinsic and intrinsic barriers. This study will also offer recommendations for developing a method of technology integration that enables teachers to rise above these obstacles at the local school level. The importance of this study, like most initiatives in education, is to support and improve the academic achievement of students. This study plans to foster

that support and quest for achievement through an exploration of effective technology integration, an examination of existing teacher pedagogy, and an investigation of current instructional methods.

The following chapter provides a review of the literature that considers influences on technology integration in the classroom. Chapter 3 provides an overview of the methodology chosen to construct findings, as well as to gather, analyze, and triangulate data. The chapter also provides information about the theoretical frameworks that influenced the researcher's thinking about teacher perceptions, technology integration, and first and second-order barriers. Chapter 4 illustrates the findings of the study, clarifying the limitations, assumptions, and biases surrounding the research. This dissertation study concludes with an explanation of the rationale and implications of the research, offering suggestions for future avenues of study and explicating the researcher's development as a teacher leader through the Educational Leadership doctoral program at Rowan University.

Chapter II: Review of the Literature

The ingredients for successful technology integration in schools seem to be in place, including access to technology (Becker & Ravitz, 2001; Ertmer, 2005; Watson, 2006) and improved professional development training for teachers (Cole, Simkins, & Penuel, 2002; Strehle, Whatley, Kurz, & Hausfather, 2001); however the integration of technology into the curriculum is still surprisingly low (Cuban, Kirkpatrick, & Peck, 2001). Barriers for successful technology integration have been identified through qualitative analysis and observational work (Cuban, et al. 2001; Strehle, et al., 2001), through quantitative surveys and analysis (Becker & Ravitz, 2001; Wood, Mueller, Willoughby, Specht, Deyoung, 2005), and through numerous mixed method research approaches (Dexter, Anderson, and Becker, 1999; Judson, 2006; Sugar, 2005). These studies suggest that external and internal factors affect the ability of teachers to effectively integrate technology. For example, possible barriers include the pedagogical beliefs of the teachers with regard to technology, context and access issues, support issues such as the lack of professional training and technical support, and computer and hardware problems such as technical issues and malfunctions.

The following chapter will take a closer look at the extrinsic and intrinsic influences affecting technology integration in classrooms across the United States, in New Jersey schools, and at the local district level in Huntington Township. This review of the current literature focuses on the guiding principles that dictate how and why teachers implement technology in the classroom. This chapter explores the federal, state, and local policies that support, and sometimes inhibit, technology integration in an educational environment.

Starting at the federal level, this chapter provides a glimpse into technology integration in a much larger context with an examination of the Government Performance and Results Act of 1993 (GPRA), the No Child Left Behind Act of 2001 (NCLB), the U.S. Department of Education's *Enhancing Education Through Technology* (EETT) program, and the National Educational Technology Trends Study (NETTS). (Government Performance and Results Act, 1993; No Child Left Behind, 2001; U.S. Department of Education, 2007; U.S. Department of Education, 2009). By taking a closer look at *The Educational Technology Plan for New Jersey: Preparing Today for Tomorrow*, the researcher hopes to provide evidence of how the New Jersey Department of Education attempts to help teachers utilize technology to help students "meet the challenge of a dynamic global society" (New Jersey Department of Education, 2007). Finally, this chapter narrows the context of the technology integration topic to a local educational environment by taking an exploratory look at the Huntington Township School District's (HTSD) *Educational Technology Plan 2007-2010* (Huntington Township School District, 2007) and noting how the district planned to support teachers at Holly Elementary School by providing them with the instruments and methods to overcome obstacles that hinder successful technology integration.

Federal

The term "educational change" describes a wide range of political, economic, educational and cultural tendencies that shape who we are, what we do, and how we go about accomplishing what we want to do. Educational change has become one of the most popular catch phrases of the 21st century. From business to education, from crime prevention to medicine, change is universal. In the kindergarten through 5th grade

context, change encompasses every part of our daily lives. Schools and school districts are driven by change, and change is driving education in different directions. Understanding change isn't important for educational leaders -- it's a necessity.

With that in mind, the educational leader must be able to assess the needs (and wants) of the community, the school, and the students. How do programs and equipment change the role of teachers and their teaching styles? How can technology enhance the day-to-day operations of the classroom and school? How can we, as school leaders, utilize technology to improve the quality of teaching and student learning?

To answer these questions, educational leaders need to understand change and its impact on the community and the school. Purchasing high-end computers, printers, interactive white boards, and videoconferencing equipment does not guarantee that the equipment will be used or used correctly. School e-mail and Internet access are invaluable tools for teaching and learning, but more times than not, they are not used for school related business. Too often, schools and school districts purchase math, science, and reading programs that are ill-conceived or are not utilized to their utmost potential.

As educational leaders and as pioneers into the 21st century of globalization, it is essential to have a clear vision of the change process needed to create a successful learning environment. This vision must start at the federal level and be shared and supported by all stakeholders. The development and implementation of this vision must ensure the success of students and staff and should be clearly stated. To guarantee the credibility of the government's vision and mission, the plans should be regularly monitored, evaluated, and revised by the educational leaders, the U.S. Department of Education, and New Jersey's Department of Education. Only then can educational

change have a powerful effect on the classroom environment and change the relationship between teachers, learners, and the global community within which we all operate.

Government Performance and Results Act. In 1993, the United States government enacted the Government Performance and Results Act. The GPRA was one in a series of laws intended to improve government project management (Government Performance and Results Act, 1993). The GPRA requires government agencies to set goals, measure progress, and provide reports detailing improvements or deteriorations. To comply with GPRA regulations, agencies have to develop five-year strategic plans, prepare annual performance plans that establish set goals, and provide annual performance reports detailing whether or not the agency has successfully met their targeted goals.

The technology related objectives of the GPRA (1993) are to improve access to educational technology, to provide technology-related teacher professional development, to ensure technology integration into instruction, and to increase student technology literacy. Three of the four requirements set forth by the GPRA serve as the focus of this researcher: access to technology, technology-related professional development, and technology integration.

These three requirements are also aligned with the priorities put forward by the U.S. Department of Education's *Enhancing Education through Technology* (EETT) program. The EETT program is part of the No Child Left Behind Act (NCLB) of 2001 and provides detailed information about educational technology and instructional practices in the United States (U.S. Department of Education, 2009). The next sections will take a closer look at the NCLB Act of 2001, the EETT program, as well as U.S.

Department of Education's National Education Through Technology Study (NETTS) of 2007.

No Child Left Behind Act. In 2002, President George W. Bush signed the No Child Left Behind Act (NCLB) into law. The bill had overwhelming support from both Republican and Democrat congressional members. Like the GPRA, NCLB is based on establishing high standards and setting measurable goals that can improve student achievement in education. The act also requires states to assess student skills levels to receive federal funding. Part D of the NCLB act is entitled *Enhancing Education through Technology* (EETT) (No Child Left Behind Act, 2001). The EETT details the federal government's purpose and goals for educational technology at the federal, state, and local level.

Enhancing Education through Technology. As was previously stated, the EETT program is part of the NCLB Act of 2001. The three goals explicitly defined by the legislation are: (a) to provide access to, and use of, educational technology to improve student academic performance, (b) to guarantee the technology literacy of all students by the eighth grade, and (c) to provide professional development training for teachers, including best practices and research-based instructional pedagogy that effectively integrates technology (U.S. Department of Education, 2009).

In the 2009 report, *Evaluation of the Enhancing Education Through Technology Program: Final Report*, the U.S. Department of Education Office of Planning, Evaluation and Policy Development Policy and Program Studies Service (2009) focused on four key topics: (1) to help ensure that teachers have access to educational technology, (2) to provide professional development opportunities to promote effective technology

integration for teachers and administrators, (3) to encourage districts to fully integrate technology into the curriculum, and (4) to demonstrate the ability of students to meet the state technology literacy standards.

The conceptual framework of the EETT also describes the relationship between the investment in technology resources (hardware, software, and Internet access), support for technology-based professional development training, and the integration of technology instruction, and the increase of student academic achievement. In the subsequent sections of this chapter, the researcher will take a closer look at the first three key topics as defined by the GPRA indicators: technology access, technology-related teacher professional development, and technology integration (U.S. Department of Education, 2009).

Technology Access. By 2005, most schools in the United States had access to the Internet (U.S. Department of Education, 2009). However, Internet access is no longer the benchmark of technology access when discussing the availability of technology for instructional purposes in an educational setting. The EETT used the accessibility of high-speed Internet access in classrooms, as opposed to the unmanageable "dial-up Internet connection speed" classrooms, to establish a measure of technology availability in an educational setting. Of the teachers who were surveyed in 2007, 63% of the teachers reported that their classrooms had high-speed Internet access, as opposed to the 54% of teachers that reported having high-speed access in 2005.

Although there were numerous measures to determine availability of high-speed Internet access in the classroom, there were very few measures determining access to laptops, computers, interactive white boards, and other instruction-based technology

resources. In the Department of Education's 2009 report, very little was mentioned about access to different instructional technologies at the district or local school level. However, in the 2010 National Education Technology Plan, *Transforming American Education: Learning Powered by Technology*, a much more comprehensive definition of technology access is addressed (see Figure 2.1).

The objective of the 2010 technology plan is to create an infrastructure for students and teachers, giving them access to people, resources, processes, policies, and "sustainable models for continuous improvement" (U.S. Department of Education, 2010 p. 51). This "cyberinfrastructure" will allow teachers to connect with individual teachers, groups of educators, learning communities, and other professionals outside the confines of the traditional classroom. According to this innovative plan, conventional classrooms will be strengthened by an infrastructure with the ability to connect to libraries, museums, homes, and offices throughout the country and around the world. Additionally, the new plan calls for technology to be in the hands of both students and teachers in school and at home, suggesting that access to technology and technology resources needs to occur twenty-four hours a day and seven days per week. To provide access for every student and educator, schools are looking to low-cost mobile devices that can be used in school and taken home after school hours, such as netbooks, iTechnologies, wireless readers, and other portable devices.

Professional Development. Much of the recent literature expresses the need for teacher support when integrating technology into instructional practice (Ertmer, 1999; Sugar, 2005). In the 2009 Department of Education's study on the EETT, the National Educational Technology Trends Study (NETTS) reported that the majority of districts

provided professional development for integrating technology in the 2006-2007 school year (U.S. Department of Education, 2009). Of the teachers who responded to the survey, 86% reported that they had participated in technology-based training in the summer of 2006 or during the 2006-2007 school year.

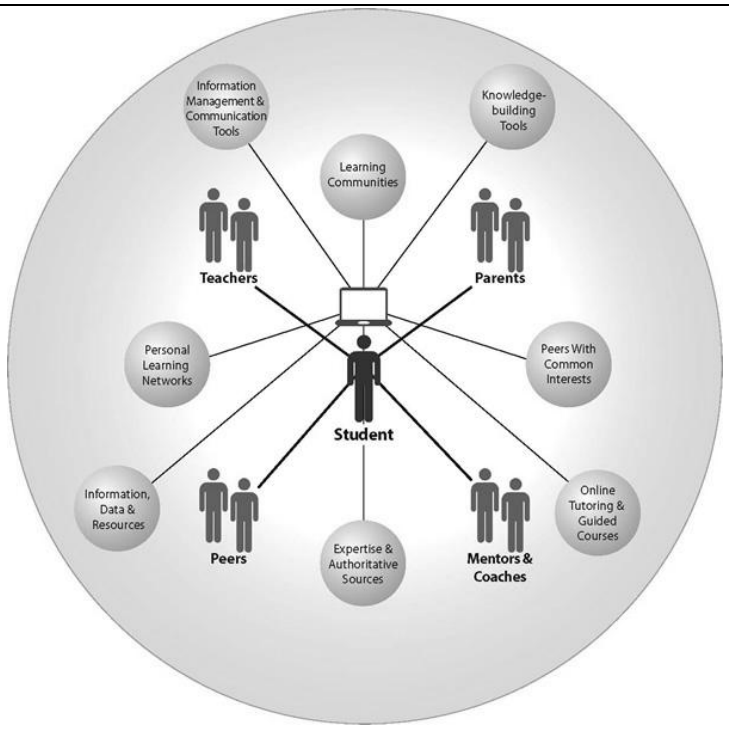

Figure 2.1 Technology supports learning by providing greater access to resources available inside and outside of the traditional classroom environment (U.S. Department of Education, 2010).

For the most part, the responding teachers agreed that the technology-based professional development training they received was in fact aligned with the technology-based training that was desired (U.S. Department of Education, 2007). Only a small percentage of teachers reported that the training received would not benefit them

professionally. However, more than half of the teachers surveyed (52%) indicated that they would have benefited from additional professional development on technology-based instructional approaches. Technology training to develop student knowledge in reading and technology training to develop student learning in math were the two most cited topics for supplementing technology-based professional development. In general, the data suggests focusing professional development resources on instructional uses of education technology and away from routine uses of technology, such as processing student grades, utilizing e-mail, or accessing the Internet.

Technology Integration. For the purpose of this study technology integration in an educational setting is defined as the infusion of technology-based resources into the core content standards to enhance student achievement. The primary goal of the EETT program is "to improve student academic achievement through the use of technology in elementary and secondary schools" (No Child Left Behind Act, 2001). NCLB believes the integration of technology for teaching and learning must take into account the role of the teacher as well as that of the student (No Child Left Behind, 2001). NCLB requires all states to "effectively and fully" integrate technology, but NCLB does not define or provide a measure for effective technology integration. Instead, NCLB allows states and districts to offer their own definition of successful technology integration (U.S. Department of Education, 2009). At the time of this study, only 15 states reported a percentage of their districts had met the state definition of full technology integration. Some states failed to respond at all, while others reported not having a statewide definition of technology integration.

State

The term "globalization" has become a fashionable buzzword in our society, as well as in education. Likewise, the terms "21st century skills" and "21st century learners" are prominent in the current research literature. Interestingly, there is little information available about the origin of the 21st century initiative. In education, the terms 21st century "skills" and "learners" can be traced back to an organization called the Partnership for 21st Century Skills (P21). Founded in 2002, P21 is a national organization that advocates for the educational readiness of all students. P21 was formed with the assistance of the U.S. Department of Education and a partnership with additional founding members that include some of private industries biggest companies: AOL Time Warner, Apple Computer, Cable in the Classroom, Cisco Systems, Dell Computers, Microsoft Corporation, National Education Association, and System, Applications, in Data Processing. The mission of P21 is to establish a 21st century readiness in the United States kindergarten through 12th grade education system by building a collaborative partnership between education, business, community, and government leaders (Partnership for 21st Century Skills, 2011).

The fundamental components of P21's 21st century learning framework are categorized into outcomes and support systems (see Figure 2.2). The student outcomes are split into four categories: Life and Career Skills, Learning and Innovation Skills – 4Cs (Critical thinking, communication, collaboration, and creativity), Information, Media, and Technology Skills; and the overarching Core Subjects – 3Rs category (Partnership for 21st Century Skills, 2011). The systems that support these 21st century skills are categorized into four categories as well: Standards and Assessment, Curriculum

and Instruction, Professional Development, and Learning Environments. The partnership views all of the aforementioned components as "fully interconnected in the process of 21st century teaching and learning" (Partnership for 21st Century Skills, 2011).

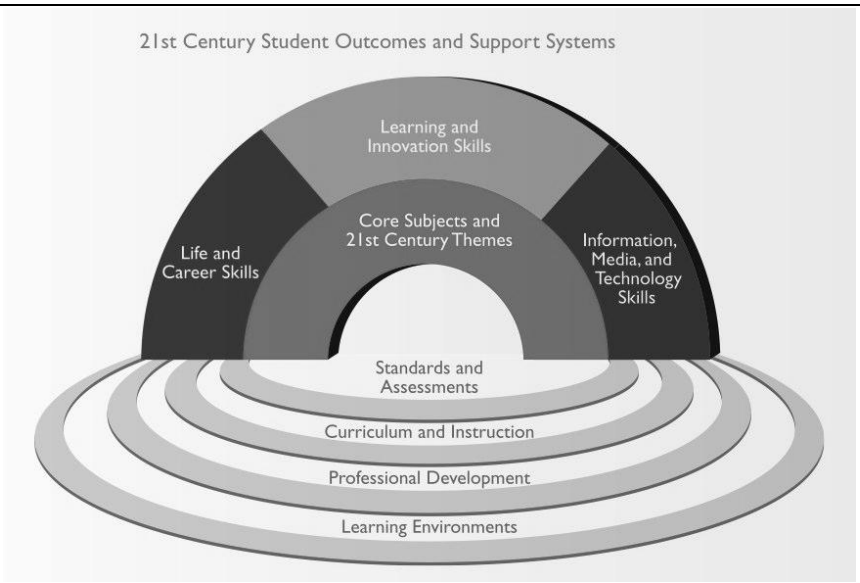

Figure 2.2. The key elements for 21st Century skills are represented in the graphic. Student outcomes are represented in the arches above, while 21 Century support structures are below (Partnership for 21st Century Skills, 2011).

According to the N.J. Department of Education's *Educational Technology Plan for New Jersey: Preparing Today for Tomorrow*, the state is committed to preparing the students of New Jersey with the 21st century skills necessary to excel in the workplace and in our global society (N.J. Department of Education, 2007). In fact, New Jersey's technology vision statement affirms, "All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information and ideas" (p. 9). New Jersey's technology plan is assembled into four distinct objectives. Each goal emulates the goals

and objectives of the EETT, as written in NCLB, and the 21st skills presented by the P21 (N.J. Department of Education, 2007; No Child Left Behind Act, 2001). Similar to the key topics observed in the EETT, New Jersey's goals focus on effectively integrating educational technology; increasing accessibility by students, teachers, and administrators; preparing all students for our global society; and establishing and maintaining the necessary technology infrastructure in all school districts to support the prior objectives.

District and Local School

The Huntington Township School District (HTSD) understands the significance of educational technology practices. The district also recognizes the correlation between the successful implementation of a technology-based initiative and vigilant development of a plan that ensures the success of said innovation. Since 1989, HTSD has compiled a report detailing the district's commitment to the changing needs and opportunities associated with the ever-evolving world of technology and education. As stated in the district's Educational Technology Mission Statement, Huntington promotes the success of all stakeholders by assisting the integration of available technologies in our ever-changing world (Huntington Township School District, 2007).

In 1965, co-founder of the Intel Corporation and technological guru Gordon Moore observed that the number of transistors on integrated circuits doubled every 18 months (Edwards, 2008). In other words, the capability and capacity of technology is doubling every 18 months while the size and price of that same technology is shrinking. This phenomenon has become known as Moore's Law. Moore's Law is now used to predict the long term trends in the technology industry. Huntington Township School District, however, realizes that predicting and planning for future technological

innovations is not only problematic, it can be futile. According to Moore's Law, the technology teachers are using in the classroom today will be obsolete in the classroom of tomorrow. For example, most Smart Phones used today are smaller, faster, and more powerful than the fastest computer available when this researcher started working in the HTSD 11 years ago. For that reason, the HTSD concedes that the future of educational technology is unpredictable, to say the least. The district defends its view regarding the future of technology innovation in the district's Technology Vision Statement:

> "We live in a world where change has become the constant. As a result, the world as we knew it, even as little as ten years ago, no longer exists. Hard as it may be to accept, ten years from now, today's world will have recreated itself many times over" (Huntington Township School District, 2007).

To understand the difficulties associated with predicting the future of technology reform, the HTSD uses available data to plan for future initiatives while concentrating on improving access to existing resources, improving professional development, and utilizing technology to improve best teaching practices. Huntington Township School District does this by addressing "problems identified by the staff that could be abbreviated through the use of technology" (2007).

The following sections will examine the educational community that comprises the HTSD, specifically the roles of the teachers, the technology specialist, and the administration with regard to technology integration. The researcher will also investigate how the district intended to provide professional development opportunities to support and improve the aforementioned best practices and enhance access to technology resources for all district stakeholders.

Personnel. The Huntington Township School District (HTSD) has numerous stakeholders, each charged with the task of supporting, implementing, and integrating technology into the school curriculum. The construction of a sound support structure is essential to facilitate the growing deployment and utilization of educational technologies within the school environment. From students to administrators, teachers to technology specialists, each distinct group holds a particular piece of the puzzle that, when placed together, facilitate successful technology integration.

Teachers. Teachers are the backbone of the educational technology infrastructure in the HTSD. Teachers are charged with providing students with a safe, encouraging, and engaging learning environment. They are also responsible for using technology-based tools to create "exciting and enriching" learning environments (Huntington Township School District, 2007). HTSD also provides teachers with the technology-based tools necessary to complete administrative and professional tasks, giving teachers more time to work collaboratively with peers, prepare for instruction, converse with parents, finalize grade books, and accomplish additional day-to-day responsibilities.

If technology integration is going to be effective, teachers need time for professional and curricular development (Cuban et al., 2001). Cuban notes teachers rarely have time to collectively plan as a group or grade level, little time to observe other colleagues utilizing technology, or plan for five or six class periods per day. Time is essential to learn new skills, explore available resources, collaborate with peers, and develop new lessons. Teachers state they need hours to preview and confirm safe websites, locate and save acceptable photos for multimedia projects, and hours, if not days, to take district courses to upgrade their technology skills. The pressure of time is

seen as the greatest impediment to technology integration (Strehle, 2001). Because of this, few teachers have mastered technology skills and have made fundamental changes in their method of instruction (Cuban et al., 2001). School administrators who support technology integration would be wise to incorporate time for the aforementioned activities by providing curriculum development opportunities or extended grade-level planning sessions by utilizing permanent substitutes, student teachers or support staff. School districts should also promote professional development workshops, conferences, and expos that can promote technology and technology integration, as well as develop teacher understanding, ability and confidence. Time can play a major role in technology integration, but technology usage is also dictated by schedules and access to the technology itself.

While previous research has documented the relationship and impact of the pedagogical beliefs of teachers on classroom instruction, little is known about how these beliefs influence the integration of technology (Buchmann, 1987; Lumpe, Haney, & Czerniak, 2000; Wozney, Venkatesh, & Abrami, 2006). Depending upon their definition of technology integration, teachers tend to use prior beliefs, experiences, and attitudes about learning and teaching to develop their philosophy of using technology as an instructional tool (Ertmer, 2005, McGrail, 2005). The teacher's feelings and thoughts about technology will influence how they incorporate it into their instructional practice. Educators must see the benefits of technology as an instructional instrument and be receptive to utilizing computers as a cognitive tool, prior to successful classroom implementation. Teachers ultimately determine when and how computers and other manner of technology are used (Mercer & Fischer, 1992).

If a teacher's pedagogical beliefs, familiarity, and approach toward technology suggest technology incorporation is a viable method of classroom instruction, the teacher must believe in his/her own abilities to successfully act upon those beliefs. Self-efficacy is defined as, " people's judgments of their capabilities to organize and execute the courses of actions required to attain designated types of performances" (Bandura, 1996, p. 391). Studies have shown a link between high self-efficacy on the part of the teacher and positive student performance (Watson, 2006). Previous research has also found a link between negative student performance and lower levels of teacher self-efficacy.

The constantly changing world of technology over the past decade has generated the need to help teachers harness the power of technology as an instructional tool. As the use of technology in schools grows, so has the need to facilitate the uses of technology that will eventually lead to increased student learning (Ertmer, 2005; Watson, 2006). The rapidity of the changes in technology has left teachers feeling ill-equipped and unqualified about integrating technology into their instructional practices.

To facilitate an environment for positive teacher efficacy with regard to technology, a climate must exist to allow teachers to experiment with technology without the fear of failure (Bitner & Bitner, 2002). As with any new initiative, some degree of failure is inevitable. Fullan (2001) refers to this decline in performance as an "implementation dip" and he says that our schools experience a dip when requiring new skills and new awarenesses. Teachers must be made to feel that they can make mistakes with technology in the classroom without repercussions or derision from students, peers, or superiors.

Administration. The Huntington Township School District maintains a philosophy emphasizing "for real instructional technology integration to occur in the school curriculum, administrators must play an important role as instructional leaders" (Huntington Township School District, 2007). Although administrators are not on the "frontline" or in the classroom, they can provide a level of support for teachers with the purpose of alleviating the intrinsic and extrinsic barriers that inhibit technology integration in the classroom. Intrinsic and extrinsic obstacles refer to the barriers that occur inside and outside of the teacher's ability to control (Ertmer, 1999; Sugar, 2005). Lack of sufficient resources and support can obstruct the implementation of any technology initiative. If teachers are not provided with the proper training, support, equipment, and discovery time, technology integration will be difficult to achieve. In HTSD, administration serve as "change agents to encourage, motivate, and support teachers as they explore new instructional methodologies using new tools, they must exhibit a high regard for the teaching/learning process and potential that technology provides" (Huntington Township School District, 2007).

Technology Specialists. The role of the Technology Specialist in the HTSD is continuously evolving and gradually moving away from the lead provider of instruction to that of a curriculum resource person for technology infused lessons. The HTSD defines technology infused instruction as the…

> …inclusion of technology-related objectives within curriculum guides for academic content areas (e.g., word processing and desktop publishing objectives in the language arts, spreadsheet formulas in math, database manipulation and distance learning tools in the social studies, etc.). Those methodologies which

> provide students access to technology resources and engage them in activities that lead to the acquisition of concepts and skills, whether to reinforce or extend learning, conduct research, or promote problem solving ability, extend creativity, and foster the development of higher order thinking skills. (Huntington Township School District, 2007)

Recent research indicates that teacher confidences and reservations about the process of technology integration into classroom instruction influence the degree to which the teacher integrates technology in the classroom (Becker & Ravitz, 2001; Ertmer, 2005; Wood et al., 2005). School district and local school specific issues, as well as teacher perspectives, can create barriers that limit the incorporation of new technology (Ertmer, 1999; Judson, 2006; Watson, 2006). While constantly evolving, much like educational technology itself, the primary duty of HTSD's Technology Specialist is to provide technology literacy instruction and to assist teachers with the integration of academic curriculum-technology in the classroom. Another aspect of the Technology Specialist's position is to alleviate these school specific issues by providing the appropriate professional development strategies associated with the implementation of innovative technologies and methodologies.

It is essential for teachers to have access to a variety of professional development activities including workshops, on and off-site courses, and before and after school training sessions (Cole et al., 2002). These types of opportunities provide teachers with a vision for technology integration and a model for technology implementation, along with demonstrating the process of teaching with technology. Recent research on technology and professional development suggests individualized technology training for teachers is

an essential for successful technology integration (Sugar, 2005). It has been said that "schools are in the business of teaching and learning, yet they are terrible at learning from each other" (Fullan, 2001). Districts may try to focus on in-house peer mentors to design and teach workshops or utilize an alternative program such as technology coaches. Programs like this would guarantee a connection between the trainer and the trainee, as well as providing firsthand knowledge of district and local school initiatives.

Conclusion

This chapter focused on the intrinsic and extrinsic influences effecting technology integration at the federal, state, and local levels. Starting with an investigation of the Government Performance and Results Act of 1993 (GPRA), the No Child Left Behind Act of 2001 (NCLB), and the U.S. Department of Education's Enhancing Education Through Technology (EETT) program, the researcher hoped to understand the past and present policies influencing technology integration in a larger context. It is important for a researcher to become self-aware through the reflections of the past and ruminations of the future. By examining The Educational Technology Plan for New Jersey, Preparing Today for Tomorrow, the researcher hoped to discover the supports and possible barriers to technology integration at the state level. Finally, the researcher hoped to narrow the context of technology integration to the local level by taking an exploratory look at the Huntington Township Public School (HTPS) district's Educational Technology Plan 2007-2010.

After a review of the current literature two antecedents to successful technology integration became clear: access to technology and technology-based professional development. The integration of technology into instructional practice and learning was

the primary objective. Understanding the history surrounding the policies and programs that have shaped educational technology integration, as well as the progression and development of technologies that are effectively being used in our current context, can offer a glimpse of the future of educational technology integration. Having an informed perspective of the current context of educational technology integration may assist in answering *how* teachers are using technology in their classrooms and *why* they are using it in this way.

Chapter III: Methodology

Research designs are plans to help a researcher collect, analyze, and interpret data (Creswell, 2009; Glesne, 2006). Research designs involve the selection of a topic, strategies of inquiry, methods to process data, and eventually the interpretation of that data. The three key types of research designs are quantitative, qualitative, and mixed methods. If selecting two differing dichotomies, qualitative research and quantitative research would be the two ends of the spectrum, while the mixed methods research approach could be categorized as the median of the other two.

For the purposes of this study, the researcher selected a qualitative research approach. Qualitative research seeks to investigate social or human problems by exploring their meaning through individuals or groups of people (Creswell, 2009). Qualitative research uses interviews and other forms of data collection, most often collected in the participant's environment, to analyze and interpret the meaning of the data. The final written report consists of the story as told by the participants, the reflections of the researcher, and finally, an interpretation of the initial problem.

This qualitative action research study focuses on educational technology integration in an attempt to create a collaborative process that fosters a mutually beneficial environment for the school district, the school, its faculty, and the students. The following chapter will define action research design and how the researcher utilized the action research model to conduct a participatory-based study at Holly Elementary School in the Huntington Township School District (HTSD). Later sections of this chapter will focus on the phenomenological research approach (Creswell, 2007) and will explain why the researcher believed phenomenology was the appropriate methodology

for this study. Afterward, the chapter will examine the researcher's change framework, focusing on Argyris's organizational defenses and his double-looped learning theory (Argyris, 1990). Finally, the chapter will conclude with a discussion about the collection, analysis, triangulation, and validation of the data, as well as an overview of the three research cycles.

Action Research

In 1953, Stephen M. Corey, a professor of education and a dean at Columbia University's Teachers College, wrote *Action Research to Improve School Practice*. The book became a seminal work in the area of action research and emphasized the importance of teachers researching their own profession to improve their instructional practices (Hinchey, 2008). However, due to a decrease in teachers, changing policies and school populations, and the Cold War, interest in action research waned in the 1960s and 1970s. The focus of federal government research had to do more with researchers and less with practitioners. Contemporary action research theorists still wrestle with the questions of, "What counts as research?" and, "What is action research?"

Hinchey (2008) defines participatory-based action research in an educational setting as a qualitative approach to research "that involves multiple stakeholders and intends to change not only schools but society at large" (p. 32). Although there are many views about the purpose of action research, many theorists agree upon two categories: emancipatory action research and practical action research. Emancipatory action research, or liberatory action research, is about freedom. More specifically, emancipatory action research seeks to understand educational problems by reflecting on the larger political, economic, and social conditions facing our society. Practical action

research, on the other hand, involves the identification of a specific problem or problems and seeks to employ change strategies to improve teaching practices.

This practical action research study examines first and second order obstacles to successful technology integration, how classroom teachers cope with these extrinsic and intrinsic barriers, and how the aforementioned barriers affect technology integration in the Huntington Township School District (HTSD). The researcher will also offer recommendations for developing a process of technology integration that enables teachers to overcome these obstacles at the local school level. A secondary function of this participatory-based action research study is to understand the role of the researcher as a teacher and a leader, while creating/designing a process of technology integration that takes into account the needs of all stakeholders.

Phenomenological Research

Unlike grounded theory, ethnography, case study, or narrative research, phenomenology explores the experiences of several people with regard to a specific phenomenon (Creswell, 2007). Based heavily on the writings of German mathematician Edmund Husserl, phenomenology seeks to describe what all participants have in common when experiencing a particular phenomenon. The underlying principle of phenomenology is to overlook the individual experience in lieu of providing a "universal" description of the experience from the perspective of all stakeholders.

Similar to the uncertainty that surrounds action research, phenomenology is not always seen as a viable line of investigation (Creswell, 2007). Many contemporary phenomenological researchers argue about the philosophical uses of phenomenological research today. Creswell concedes there are numerous perspectives regarding the

philosophical arguments for the use of phenomenology, but he also draws attention to some of the similarities in most philosophical assumptions with regard to phenomenology. Those similarities are: the investigation of lived experiences within a group of individuals, the belief that those experiences are conscious ones, and the development of descriptors to capture the real meaning of those experiences.

Although there are many aspects of phenomenological research, many theorists agree upon two main approaches: hermeneutic phenomenology and transcendental phenomenology (Creswell, 2007). Hermeneutic phenomenology focuses on lived experiences and the chronicling of those experiences through the eyes of the researcher. The investigation of the phenomenon takes on an *interpretive process* in which the researcher interprets the meaning of the lived experiences of the participants. The concentration of transcendental phenomenology, on the other hand, is the description of the phenomenon from the perspective of the participants. The goal of the transcendental phenomenological researcher is to see the phenomenon from a fresh perspective, as if seeing it for the first time. To embrace this idea, it is important for the researcher to *bracket off* prior experiences of the phenomenon as to not blend prior experiences with those of the participants.

The transcendental phenomenological approach (Creswell, 2007) in this study examines the relationship of intrinsic and extrinsic barriers and supports to technology integration at Holly Elementary School in the HTSD. The researcher will use a transcendental phenomenological approach to explore how teachers use technology, the role technology plays in their classroom, and the teacher's beliefs about effective classroom practice with regard to technology integration. To reveal the values and

beliefs that support or hinder the effective use of technology in the classroom, the researcher will bracket off his prior knowledge and experiences of the phenomenon in an attempt to get a fresh perspective regarding *how* teachers are using technology in their classrooms and *why* they are using it in this way.

Change Framework – Double Looped Learning

Argyris (1990) explains how to diagnose problems that are present in today's organizations and how to take corrective action to eliminate existing and imminent problems. Individuals are well versed in skilled incompetence, the art of creating error. However, individuals are unaware of their errors, which in turn produce incompetence. Argyris suggests individuals produce errors on purpose, covering up the errors to avoid embarrassment or threat. This type of behavior is called *organizational defense,* and people hide these defense routines from themselves and their organization. The best advice does not always cure the problems facing organizations and deep seated defense routines can hinder an organization's ability to change. To overcome organizational defenses and encourage change, organizations must expose the *by-passes,* uncover the *cover-ups,* and allow individuals to discuss the *undiscussables* (Argyris, 1990).

Argyris (1990) describes two theories of action used by individuals. The first is the *espoused theory,* which is made up of beliefs and values learned early in life. The second is the *theory-in-use,* which determines how individuals act, especially in dealing with threatening or embarrassing issues. Caring, respect for others, honesty, strength, and integrity are all social virtues learned in early childhood which help support the *Model I theory-in-use*. Interestingly, these same virtues, when used to deal with upsetting or embarrassing issues, result in defensiveness and misunderstandings. The result of this

confusion is a skilled unawareness and incompetence that contradicts the original intentions of the *espoused theory*.

Organizational defense routines prevent individuals, groups, and organizations from noticing and correcting errors that are embarrassing or threatening by following fundamental rules: (1) bypass the errors and act as if they were not done, (2) make the bypass undiscussable, and (3) make its undiscussability undiscussable (Argyris, 1990). These rules complicate an organization's ability to dismantle organizational defense routines and any attempt to interrupt or reduce the defense routines only strengthens and reinforces them. These defense routines lead to "fancy footwork," or cover ups, which eventually lead to "malaise" (i.e. hopelessness, cynicism, and distancing), and inevitably mediocre performance. Argyris believes this *Model I theory-in-use* is designed to produce defensive consequences and therefore requires defensive reasoning. *Model I*, and single-looped learning, is intended to make people unaware of their counterproductivity. To escape from the paradoxical puzzle of defense routines and single-looped learning, Argyris offers a *Model II theory-in-use* (see Figure 3.1).

The *Model II theory-in-use* is a theory managed by informed choice, valid information, and the ability to observe how well the choice is applied (Argyris, 1990). There are two action strategies when implementing *Model II*: (1) Advocate your position and encourage inquiry or confirmation of it and (2) Minimize saving face. The only way to disrupt organizational defense patterns is to show how counterproductive these routines can be to the individual and the organization. This process of productive reasoning and double-looped learning will automatically address the defense routines,

fancy footwork, and malaise that need to be interrupted for the *Model II theory-in-use* to be successful.

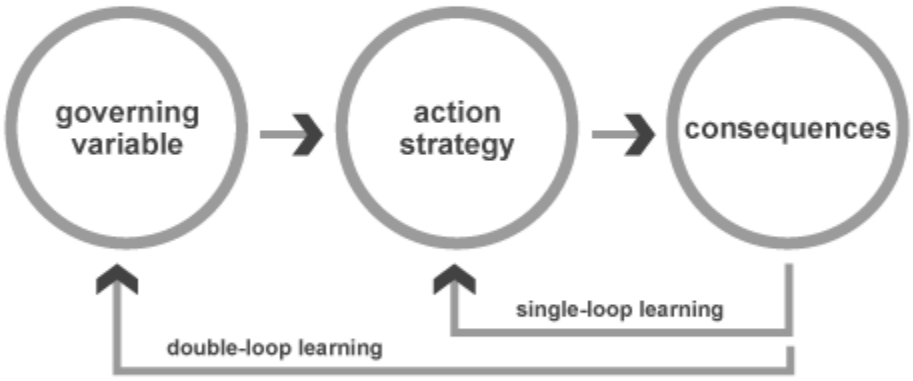

Figure 3.1. Single-loop learning focuses on developing short term action strategies for technology integration. Double-loop learning addresses the governing values influencing the successful implementation of technology initiatives (Argyris, 1990).

A peripheral purpose of this action research study is to understand the researcher's role as a teacher and a leader, while creating/designing a process of technology integration that takes into account the needs of all stakeholders. To do this,

the researcher has to identify teacher perceptions about technology integration, the expectations of the HTSD, and the researcher's role as the Technology Specialist. To achieve this goal, the researcher will examine the supports and barriers of successful technology integration and the current single-looped learning model (Argyris, 1990) and will offer a double-looped theory-in-use which focuses on values governing technology integration in the HTSD and Holly Elementary School.

Data Collection

Qualitative research investigates social or human problems by exploring their meaning through interviews and other forms of data collection (Creswell, 2009). In this action research study, the researcher's first data collection method utilized a qualitative survey distributed to the classroom teachers at Holly Elementary School. To improve the validity of the questionnaire, the qualitative surveys were critiqued via "think-alouds" (Patton, 2001) and reviewed by peer debriefers (Creswell). Respondents to the survey were considered a census (Patten). The sampling was considered a census because the researcher wanted to study all twenty classroom teachers at Holly Elementary School. Even though only fourteen of the teachers responded to the survey, the researcher was able to make sound generalizations from the surveyed population.

The qualitative survey was distributed to the participating teachers in person. The purpose of the survey was to gauge the feelings, thoughts, and mindset of the classroom teachers at Holly Elementary School with regard to technology integration. These open-ended surveys were analyzed and coded for themes using qualitative research methods (Bogdan & Biklen, 2007; Glesne, 2006). The limitations of this type of data collection

instrument include difficulty in interpreting data, an inability to rephrase questions, and an inability to clarify answers.

During the second cycle, interviews and observations were used as data collection instruments (see Appendix A). Utilizing a semi-structured question format, interviews permitted the researcher to explore research themes through open-ended interview questions while providing comparative analysis due to same or similar questions asked to all interviewees (Bogdan & Biklen, 2007). Observations allowed the researcher to record individual or group behaviors via field notes (Creswell, 2009). Unstructured observations allowed the researcher to record field notes while acting as an active participant in the study and as a non-participant observer. Limitations of these forms of data collection include the intrusiveness of the observer, the difficulty of gaining a good rapport, the potential bias which the researcher's presence may create, and the varied perception and articulation levels of respondents.

The researcher also utilized audio and video recording methods while capturing data provided during interviews and observations. The unobtrusive nature of the audio and video recordings provided a great advantage with data collection (Creswell, 2009). Interviews were easily transcribed by a transcription service and provided accurate data for analysis and interpretation. All interviews were scheduled during a time that was convenient for the participants and all interviews were conducted in the classroom teacher's room.

The final data collection method utilized by the researcher was a journal. The journal was updated for the duration of the action research study. By journaling throughout the study, the researcher was able to record narratives and anecdotes that

impacted the study, the researcher's espoused leadership theory, and the researcher's leadership theory in use. Journaling also enabled the researcher to reflect upon past experiences and to use that information to formulate future cycles of the study.

Data Analysis

The technique of data collection is an ongoing process that requires the researcher to continually reflect about the questions he/she asks and the data obtained from those inquiries (Creswell, 2009). As stated earlier, data can come from numerous instruments such as interviews, surveys, observations, audiovisual aids, and journaling. The qualitative data collected for this action research study involved all of the above.

After the raw data was collected, the first step in the analysis process started. Surveys, field notes, journal entries, and interviews were transcribed into a Microsoft Word document. The next step of the data analysis process involved a quick read of all materials. During this step of the analysis, the researcher was trying to establish the general meaning and tone of the data, as opposed to searching for themes (Rossman & Rallis, 1998). Hand written notes were made in the margins of the documents, chronicling the general thoughts and feelings of the researcher while processing the data.

During a second and third evaluation of the transcribed data, the researcher began to create a coding process to gain a clearer representation of the collected data. Coding "is the process of organizing the material into chunks or segments of text before bringing meaning to the information" (Rossman & Rallis, 1998, p. 171). A code is a way for the researcher to identify the main categories represented in the data. For example, the code "TB" could be used to identify a theme revolving around "Teacher Beliefs." Appendix B illustrates the initial coding index used during cycle I of this research study. Utilizing

Microsoft Excel, transcripts were separated by code, placed into a spreadsheet, and color coded to make the sorting of categories less complex.

Once coding was complete, a more concise picture of emerging themes took shape and analysis began by tying the themes back to the primary research questions posed at the beginning of the action research project (Creswell, 2009). The two key themes throughout the entire research study were the intrinsic and extrinsic factors that inhibit successful technology integration. The intrinsic factors were divided into two sub-categories: teacher beliefs and teacher efficacy. Extrinsic factors inhibiting successful technology integration were separated into four sub-categories: time, access, training, and support. The final phase of data analysis is interpreting or theorizing about the findings. It is important for the researcher to remember that there is no one correct interpretation of the findings; any given interpretation of the data is merely one of many possible explanations (Hinchey, 2009).

Triangulation and Validation

The validity of qualitative research is determined by the accuracy of the findings gathered using specific qualitative procedures, while the reliability of the research is governed by a consistent approach spanning diverse qualitative projects (Creswell, 2009). For this action research study, the researcher utilized multiple data collection methods to triangulate data and establish validity for the project (Bogdan & Biklen, 2007; Creswell, 2009; Glesne, 2006, Hinchey, 2009).

Not unlike triangulation, the incorporation of member checking was also used to determine the accuracy of the data (Creswell, 2009). Member checking is a validity strategy used to determine the accuracy of the qualitative findings. At the conclusion of

the third cycle, participants were given access to their transcribed interviews, as well as survey data, to check for accuracy and allow an opportunity for participants to comment on the findings.

Another procedure that added to the legitimacy of the study was the rich, detailed description of the findings. Creswell (2009) and Hinchey (2009) both describe the importance of rich descriptors, varying perspectives, and meaningful details when creating a narrative. Utilizing a qualitative strategy of inquiry, the researcher was able to offer a description of the first and second order barriers to successful technology integration, how classroom teachers cope with these extrinsic and intrinsic barriers, and how the aforementioned obstacles affect technology integration at Holly Elementary School.

Having been the Technology Specialist at Holly Elementary School for the past 10 years, the researcher brings a certain amount of bias to the study. It is important for the researcher to become self-aware through reflections of the past and ruminations of the future. Understanding the role of a participant researcher, a Technology Specialist at Holly Elementary School, a teacher, a peer, and a friend, creates a sincere and truthful narrative that the researcher hopes will "resonate" with the reader (Creswell, 2009).

The final two validation strategies used by the researcher are prolonged time in the field and peer debriefing (Creswell, 2009). By the very nature of the researcher's job description, spending additional time at the site and with the people intimately involved in the study was not a problem. Being onsite provided the researcher with a more accurate ability to provide details of the participants and their setting. This type of comprehensive account provided more legitimacy to the findings. Finally, the researcher

employed a peer debriefer to increase the accuracy of the findings. A peer debriefer provided an objective perspective from a person outside the boundaries of the study, who could review the data and make inquiries that the researcher may have overlooked.

Action Research Cycles

This action research project consisted of three cycles. The first cycle began in spring 2010 and spanned from January until March. The second cycle ran from March 2010 until June. Cycle III started during the summer 2010 and lasted until January 2011. The implementation of the action research project lasted for approximately twelve months and extended over a portion of two school years.

The following section will provide an overview of the three cycles of this action research study. Starting with cycle I, after asking for permission from the district superintendent (see Appendix C) and obtaining signed consent forms from perspective participants (see Appendix D), the researcher distributed a qualitative survey (see Appendix E) to the faculty at Holly Elementary School. The purpose of the survey was to identify how teachers were using technology in the classroom. Additionally, the researcher sought to examine how classroom teachers were coping with extrinsic and intrinsic barriers inhibiting successful technology integration. After reviewing post-survey data from the first cycle, the second cycle prompted the formation of a technology team. A teacher's successful use of technology initiatives is, in part, influenced by district directives, for which teachers feel they have very little input. The purpose of the technology team was to provide teachers with a contributing voice with regard to technology initiatives. Feedback and suggestions by the technology team dictated the direction of cycle III. Cycle III consisted of multiple initiatives running concurrently

including: the purchase and implementation of new technologies, an augmentation to the schedule and responsibilities of the Technology Specialist, and a renovation of existing collaborative resources for teachers. The objective of cycle III was to create a collaborative environment in which all stakeholders are equally engaged and involved in the planning and implementation of technology infused lessons.

Action Research Cycle I

Description. The first cycle of the action research study started in January 2010 with the distribution of a qualitative open-ended survey. The survey, and the subsequent review of the current literature regarding educational technology integration, was intended to be a fact gathering endeavor. The researcher utilized data collected by the qualitative survey, field notes, and teacher observations to gauge the climate and state of mind of the teachers in the HTSD with regard to technology integration. Specifically, cycle I sought to determine how classroom teachers cope with the extrinsic and intrinsic barriers related to technology integration at Holly Elementary School. Cycle I ended in March 2010.

Plan. Planning for the first cycle of the action research project commenced with the review of pertinent information about educational technology integration at the federal, state, and local levels. These artifacts included the No Child Left Behind Act (2001), *The Educational Technology Plan for New Jersey*: *Preparing Today for Tomorrow* (2007), and, more specifically, the Huntington Township School District (HTPS) *Educational Technology Plan 2007-2010* (Huntington Township School District, 2007). Once the researcher established a knowledge base of relevant literature and

focused on a specific question of research, a qualitative survey was constructed to aid in the collection data pertinent to the study.

Act. The action taken during cycle I was the distribution of a qualitative survey consisting of four open-ended questions. The participants who completed the qualitative survey included 20 elementary school teachers ranging from kindergarten to fifth grade. Respondents to the survey were a census sampling (Patten, 2001). Of the participating teachers, 19 were female and 1 was male, all with varying levels of teaching experience. Within one week, the researcher received 14 completed surveys and 14 signed consent forms. The researcher followed up with non-respondents to determine why they chose not to participate in the study. Two staff members were ill and were not available for a number of days. Two staff members stated that they had forgotten to fill out the survey and promised they would turn in their completed surveys the following day, but the surveys were never received. The last two staff members never replied to the survey or the researcher's inquiries.

Observe. Casual observations took place throughout the entire cycle. The researcher paid special attention to body language and other non-verbal communications by the faculty members involved in the study. All observations were recorded as field notes and journal entries and added to the rich narrative of cycle I.

Reflect. Since reading Argyris's study (1990) and noting his distinctions between "espoused theories" and "theories in use," the researcher contemplated the hierarchical framework of the Huntington Township School District and the change strategies that are currently in use, especially with regard to technology integration. The Huntington Township School District, along with many school districts in the country, is a perfect

example of Mintzberg's Professional Bureaucracy (As cited in Bolman & Deal, 2003). There are relatively few managerial levels between the teachers and the superintendent (see Appendix F). At the local level, the school level, teachers work in relative autonomy throughout the day. More often than not, instructional initiatives are conceived at the district administrative level and are put into practice at the individual school level. Technology initiatives are no different than other instructional initiatives in that they are usually hierarchical in nature, and employ a top-down implementation procedure as their guiding principle. For that reason, it was very important to understand the teachers' perceptions of the district's technology initiatives.

Action Research Cycle II

Description. The second cycle of the action research study began in March 2010 with the formation of Holly Elementary School's technology team. During the first cycle, teachers clearly expressed their frustration with the implementation of district initiatives and directives in which they have very little input. While teachers believed the district provided state-of-the-art educational technologies to improve student achievement, they were irritated by limited teacher contribution with regard to the development and planning of the technology proposals. Additionally, teachers were frustrated by the lack of training and time allotted to explore and become familiar with new technologies prior to introducing them into the classroom.

After reflecting on the findings from cycle I, the researcher, working in conjunction with the school's principal, decided to form a technology cohort. The purpose for creating the technology team was to build a smaller professional learning community whose sole function was to explore technology integration at Holly

Elementary School. The learning community explored specific areas of technology integration available to the school. After investigating these technologies, the technology team relayed the acquired knowledge to the staff. The staff then provided feedback and suggestions to the technology team for future technology undertakings. This "give and take" of information created a self-sustaining and reinforcing feedback loop (Argyris, 1990) with regard to technology integration at Holly Elementary School.

Plan. Survey data suggested that teachers did not feel they had enough input when it came to the implementation of technology-based initiatives. Technology integration was already an area of interest for the building principal; with her consent, the researcher was able to e-mail the staff asking for volunteers to form a collaborative learning community to focus on technology initiatives at Holly Elementary School.

Act. The technology team consisted of 13 staff members chosen via random sampling (Patten, 2001). The team was composed of a diverse cross section of the staff at Holly Elementary School: 1 administrator, 1 Technology Specialist (the researcher), 1 special area teacher, 1 special education teacher, 1instructional associate, and 8 regular education teachers. The technology team consisted of members with varying ages, levels of teaching experience, and technology aptitude.

Observe. As with cycle I, cycle II's observations took place throughout the entire cycle. During technology team meetings and subsequent e-mail chains, the researcher paid attention to non-verbal communications, as well as written communications, between team members. Observations were recorded as field notes and journal entries, and added to the rich, detailed narrative of cycle II.

Reflect. Based on conversations with the teachers participating in this study, the researcher was able to infer that not all teachers with computer experience are comfortable integrating technology. This could be due to the fact that technology in education is a relatively new concept and technology integration is a recent demand placed upon teachers. As existing teachers acquire technology experience on the job, and new teachers bring technological ability to the position, it can be concluded that teachers will become more comfortable with technology over time.

With the rapidly changing face of technology, many teachers may feel as though they never truly master technology integration (Wood, et al., 2005). They find themselves in a permanent role as a learner, with the belief that they will never become an expert. In no way is this more evident than with technology integration in schools, especially with respect to hardware capabilities, web-based applications, and the Internet. The intensification of the Internet in the past decade has created a need for educators to utilize the Internet as a classroom resource (Watson, 2006). As the need to incorporate technology into schools grows, so does the necessity to design a foundation for utilizing technology to promote student achievement. The rapidity and magnitude of these changes can leave teachers feeling apprehensive, anxious and unprepared about technology integration.

The formulation of the technology team provided teachers with a voice regarding technology exploration and implementation at Holly Elementary School. Creating smaller learning communities allowed teachers to acknowledge and anticipate various technology difficulties and to develop new strategies and skills to overcome a variety of barriers (Ertmer, 1999). Similar to the concept of Connected Teaching (see Figure 3.2),

introduced by the Department of Education in their 2010 National Education Technology Plan: *Transforming American Education: Learning Powered by Technology* (U.S. Department of Education, 2010), the objective of the technology team was to create a collaborative environment for teachers. This environment empowered teachers to develop, administer, and access professional resources and content needed to produce a successful learning environment for their students both inside and outside of the classroom.

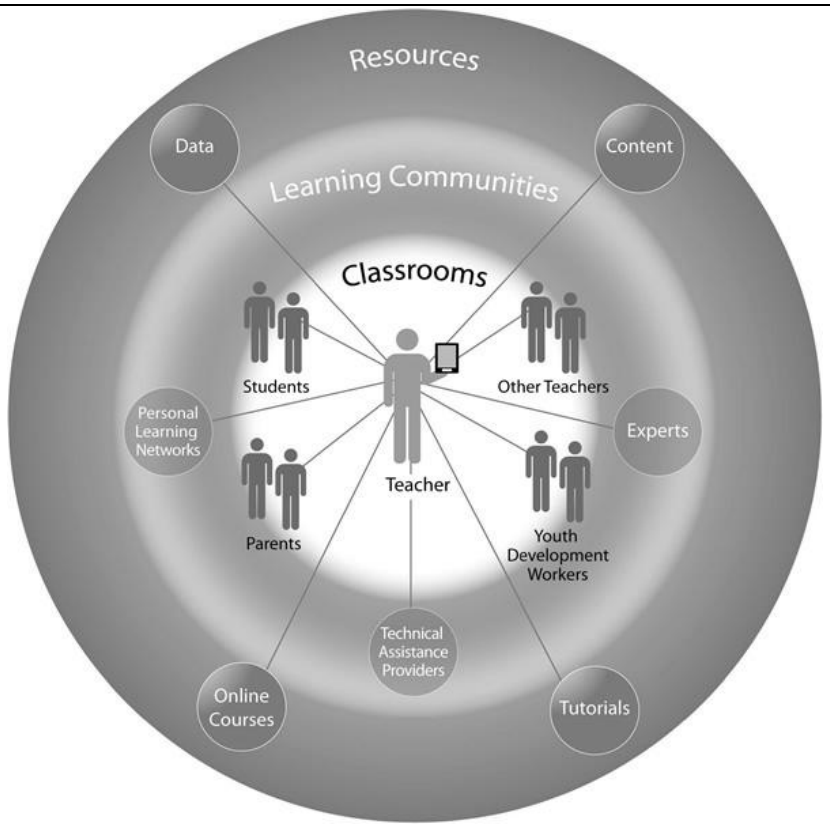

Figure 3.2 Connected teaching empowers teachers by provide resources, support, and content required to support student achievement. (U.S. Department of Education, 2010).

Action Research Cycle III

Description. The third cycle of the action research study began in the summer of 2010 with the recommendations of Holly Elementary School's technology team and some unplanned financial good fortune. After a reflection of the data collected in cycle II, the researcher determined that teachers at Holly Elementary School wanted more time and access to new technologies, including a 1:1 computer to student ratio.

Plan. The researcher utilized feedback from the technology team to determine the technology needs and wants of the school. It was clear the staff wanted more time to develop instructionally-based technology initiatives to improve teaching methods and enhance student achievement. Teachers were also interested in greater access to existing and new educational technologies, as well as additional technical support to assist them with the integration of those technologies. Interestingly enough, and occurring concurrently with the study, HSTD was awarded E-rate money by the federal government. E-rates are funds given to schools and libraries to obtain and maintain an affordable telecommunication and Internet infrastructure (U.S. Department of Education, 2011).

Act. Upon learning about the E-rate awarded to the school, the researcher presented the principal with a proposal to purchase 24 Dell Netbook computers (see Appendix G) and a plan to place the laptops in a 3rd grade classroom. The proposal was a result of an analysis of the data collected in cycle II. After the implementation, each third grade classroom had access to the laptop cart, providing the third grade teachers with the ability to have a 1:1 computer to student ratio at any given time during the school day. In

addition to supplementary access to technology, the researcher focused on time for instructional development and technical support in cycle III.

Student enrollment at Holly Elementary School has been on the decline for the past few years. The number of teachers and classes per grade level at Holly Elementary School is also in decline. The decline of students, teachers, and classes per grade level affects the schedule of special area teachers at Holly Elementary School, including the schedule of the Technology Specialist. As previously stated, the role of the Technology Specialist is "continuously evolving, moving gradually away from that of a lead provider of instruction to curriculum resource person and technology integration facilitator" (HTSD). With the aforementioned job description in mind, the current enrollment situation at Holly Elementary School, and the teacher's need for additional time and support, the researcher was able to modify his schedule to offer classroom teachers an additional class period every time they are scheduled for the computer lab.

Finally, in an effort to supply the teachers with an additional technology-based support structure, the researcher revamped an existing storage facility for instructional technology-based resources. The purpose of the overhaul was to provide teachers with a more user-friendly environment in which teachers could create, save, and share technology infused projects, lesson plans, and other forms of media.

Observe. As with cycle II, cycle III's observations took place throughout the entire cycle. During the third cycle, the researcher concentrated on non-verbal communications, written communications between team members, and other staff communiqués. Observations were conducted in the classrooms while the researcher was a non-participant, and as an active participant in the study, depending on the situation.

Observations were recorded as field notes and journal entries and added to the rich, detailed narrative of cycle III.

Reflect. The aforementioned constructivist approach to the study was the ideal fit for this research topic and the researcher's views as a participant observer, because constructivism focuses on understanding the participant's attitudes, views, and perceptions while viewing them through a constructivist lens. By exploring the cycle through a constructivist perspective, the researcher gained insight into the participant's world and experiences via their stories, assessments, experiences, and perceptions. Goleman (2002) suggests, "Understanding the powerful role of emotions in the workplace sets the best leaders apart from the rest—not just in tangibles such as better business results and the retention of talent, but also in the all-important intangibles, such as higher morale, motivation, and commitment" (p. 5). Self-assessment is an invaluable tool for predicting how an educational leader will react in certain situations. The self-reflections that took place during cycle III provided the researcher with insights into his own interests, aspirations, skills, and values. Learning about and understanding inherent leadership styles helped the researcher recognize when and how to react to different situations that arose throughout the study, and enabled the researcher to differentiate the skills needed to act in response to most situations.

Additionally, cycle III enabled the researcher and the classroom teachers to experience a co-teaching environment outside of the confines of the computer lab. This model of collaboration lessened the extrinsic and intrinsic influences inhibiting technology integration in the classroom. Moreover, technology infused lessons were more effective and constructive when the classroom teacher and the Technology

Specialist were both involved in the planning, development, and execution of the projects.

Conclusion

This chapter defined the action research design used in this study. The researcher utilized the action research model to conduct a participatory-based study at Holly Elementary School in the Huntington Township School District (HTSD). The chapter also focused on the phenomenological research approach (Creswell, 2007) and explained why the researcher believed phenomenology was the appropriate methodology for this study. Afterward, the chapter focused on the researcher's change framework. Using Argyris's (1990) work on organizational defenses and his double-looped learning theory, the researcher described the framework for moving Holly Elementary School from a single-looped learning environment to a school that focuses on double-looped learning scenarios. Finally, the chapter concluded with an overview of the collection, analysis, triangulation, and validation of the data, as well as a summary of the three research cycles.

According to Bitner and Bitner (2002), "Before technology can effect change in the classroom, those ultimately responsible for the classroom must be considered. Teachers must learn to use technology and must allow it to change their present teaching paradigm. This is not an easy task because change can seem intimidating and threatening" (p. 95). Before teachers can incorporate technology and use it as an effective tool for instruction, it is "imperative that they possess practical strategies for circumventing, overcoming and eliminating" (Ertmer, 1999, p. 50) barriers that inhibit technology integration.

Chapter IV: Findings

Many instructional initiatives are conceived of at the federal or state levels, eventually filter down to the district administrative level and then implemented at the individual school level. Technology initiatives are no different than other instructional initiatives in that they are usually hierarchical in nature; they employ a top-down implementation procedure as their guiding principle. Teachers are not always aware of the latest initiatives until they are set up in the classroom and ready for use. For that reason, it was very important for the researcher to understand the teachers' perceptions of the district's technology initiatives.

The goal for examining technology integration, teacher pedagogy, and best practices, as with the investigation of any educational reform movement, is to help increase student learning and achievement. Instead of exploring the subject of technology integration from the end result of student outcomes, this study opted to focus on successful technology integration as it relates to the classroom teacher. Simply stated, the objective of this study was to understand why and how teachers are incorporating educational technology into their instruction. In addition, this study explored how classroom teachers cope with the extrinsic and intrinsic factors that inhibit or support technology integration in the Huntington Township School District (HTSD), specifically at Holly Elementary School.

This chapter focuses on the findings of the action research project executed at Holly Elementary School during the 2009-2010 and 2010-2011 school years. Specifically, the researcher examines the two major themes discovered during the analysis of the data: intrinsic and extrinsic characteristics that influence successful

technology integration. Additionally, the researcher expands upon the main areas of interest by dividing each theme into sub-categories and linking each sub-category to the current literature. Finally, the chapter concludes with the limitations, perceived biases, knowledge gained from the study, and the inferences made regarding the researcher's change theory.

Extrinsic Influences

Extrinsic influences inhibiting technology integration in the classroom, or first order barriers, refer to the obstacles that occur outside the teacher's ability to control (Ertmer, 1999; Sugar, 2005). Lack of sufficient technology-related resources can obstruct the implementation of any technology initiative. If teachers are not provided with the proper training, support, access to equipment, and discovery time, successful technology integration will be difficult to achieve (Cuban et al., 2001).

The teachers who participated in this action research study had mixed reactions regarding the implementation of technology initiatives in the HTSD, and particularly at Holly Elementary School. However, all 17 participants described one or more of the following extrinsic influences on technology integration at Holly Elementary School: time, support, access to technology, and professional development training. These four sub-categories are frequently cited in the current literature, and all four remained as reoccurring themes throughout the subsequent two cycles. The following sections will examine the effects of time, access to technology, professional development training, and support for the teachers at Holly Elementary School.

Time. Time was far and away the most prominent influence affecting technology integration at Holly Elementary School. The lack of time to plan, develop, and

implement technology in the classroom was cited by all 17 teachers participating in this action research study as a major barrier to technology integration.

For integration of technology to be effective, teachers need time for curricular and professional development (Cuban et al., 2001). Cuban posits teachers do not have significant time to plan as an individual, as a group, or as a grade level. A similar opinion was expressed when Participant 14 was commenting on the lack of time for technology training and collaboration at Holly Elementary School:

"It's finding the time when you're going to get people to come down, to come and sit. Unless you do workshops where their class is taken care of, I think it's going to be hard because in the 20 minutes people have in the morning, 15 minutes really with people going to duty and doing this, and doing that, a 10 or 15 minute session isn't enough [time]. If it was in-house workshops, for the morning … they're great. I know that I prepare for the afternoon sub. I get the sub in here. I know that's being taken care of while I'm learning something else. It's not taking away from the time where I need to get tests graded, essays done or prep for something else. We're so inundated and everyone wants to take the prep time away, but that's when we prepare."

Many of the teachers stated that time to plan, develop activities and lessons, or to simply just "play" and get familiar with the new technologies, was a necessity for successful integration. When asked about barriers that inhibit technology integration, Participant 8 explained, "Time – Unfortunately, I'd like to do much more with the SMART Board, but our vast curriculum and limited amount of time throughout the day, (sic) doesn't allow for any extra technology time." Participant 12 agrees, "The biggest barrier for me is time. I don't have time, while on the job, to play with the SMART

Board. Nor do I have the time to create lessons." Participant 14 simply stated, "At the minimum, we should be given time to explore the new technology."

Many teachers described the problems associated with scheduling time for discovery and planning during a prep time or at the beginning and end of the school day. There is a real feeling of stress and a sense of frustration when discussing the time to prepare for the successful implementation of technology in the classroom. This is evident when Participant 5 was asked what barriers were encountered when implementing technology in the classroom. She explains,

"Probably just time… just having the time to sit down and really think it through, or having the time to really surf the Internet more than just 10 or 15 minutes during a prep, or before the kids come in, or after school."

The same sentiment of frustration and stress was echoed when Participant 7 explained,

"I feel like when you get involved in a technology-based project you have to have the time, and I feel like we're so blocked in. You have to do this. You have to be ready for math. You have to be ready for this, and it does require a lot of time. Unfortunately, that's one of the things that holds me back too because I know how much time it takes and I don't really feel like I have that much time every day. I feel like I'm running a rat race."

Technology and technology-based curriculum initiatives have flourished at Holly Elementary School in recent years. In the last three years, laptop carts, SMART Boards, projectors, school web pages, streaming media, online grade books, and Internet-based textbooks have become the standard, as opposed to the exception. While each of the aforementioned technology initiatives offers its own unique advantages and benefits to

aid the classroom teacher with the development and delivery of instruction, they all require time to explore available resources, collaborate with peers, and develop new lessons. In cycle III of this action research study, the researcher was able to offer classroom teachers additional time for exploration and planning in the way of additional time in the computer lab. Instead of the traditional two or three 45-minutes blocks of time, each class was given an extra 45-minute block of time during their scheduled lab week. The purpose of the additional class period was to give students another day to complete their projects and to offer teachers more time to plan, collaborate, and explore existing technologies.

Even though the addition of scheduled time in the computer lab was well received by the participating classroom teachers (mainly because the extra time provided students with more time to work on their projects), the time was rarely used by the classroom teacher for planning, developing, or exploring technology related projects by the classroom teacher. Instead, teachers opted to use the time to complete other school related business (e.g. grades, grading papers, and lesson preparation).

The overload of curriculum related duties, as well as the lack of time for planning and collaboration, causes a sense of frustration and stress for the classroom teacher even with the addition of more scheduled time in the lab. This sentiment is expressed clearly in the words of Participant 7 when she states,

"Sometimes you get frustrated because it takes longer to explain everything to them, so sometimes you just skip the technology component. Like if there was a project I would like them to do on the computer, I'm like, it's just easier just to do the whole paper

and pencil method rather than take the time to teach them, then once they know it they would know it, but you hesitate sometimes."

This perpetual feeling of being overwhelmed and harried, in return, inhibits the use of technology-based resources and the integration of technology in the classroom. In actuality, teachers state they need more time to successfully integrate technology into their instruction, but when offered additional time for training, planning, and development by way of additional lab time, teachers rarely take advantage of the time. This behavior suggests an apprehension by the classroom teacher to work on technology related projects due to the fact that teachers are beleaguered with other curriculum related responsibilities or that technology integration is just "one more thing" on the classroom teacher's "to do" list and it does not have the same importance as other core subject area responsibilities. This prioritization of tasks is observed when the Technology Specialist is not available for instruction. If the Technology Specialist is not in school or is unavailable to be the "lead instructor" in the computer lab, a number of teachers opt not to utilize their scheduled computer lab times, choosing instead to stay in the classroom and work on core content area instruction.

A modification of the technology instruction process, as well as an alteration of the Technology Specialist position, can help to alleviate some of the frustration and apprehension surrounding time constraints and technology integration. The researcher will take a closer look at both of these alternatives in the technology support section.

Access. In the U.S. Department of Education's 2010 Technology Plan, *Transforming American Education: Learning Powered by Technology*, access to technology is defined as an "infrastructure" (p. 51). This infrastructure includes people,

learning resources, and policies, as well as the connectivity, servers, software, management systems, and administrative tools to maintain the infrastructure. On an operational level, and for the purpose of this study, access to technology is defined as educational resources and services provided for teachers and students at the Holly Elementary School. These technology-related resources and services include: hardware, software, data and networks, information systems, as well as professionals responsible for the maintenance and management of the aforementioned resources.

Although access to technology was one of the four major sub-categories in support of extrinsic influences to technology integration, it was not as significant a concern with the teachers at Holly Elementary School as was the sub-category of time. Many of the teachers stated the need for more computers due to class size or to fulfill the requirements for particular instructional strategies. This reaction is expressed by Participant 5 when she states,

"Definitely more computers … even though the classrooms are smaller, it was a little tough just having the two, because it wasn't enough for it to actually be like a station. Two is tough in 2nd grade. I think you need at least a 4 to 1 ratio for the students to computers, because if you think about it, a lot of times, teachers when they do stations, there's one group they're working with, and then they usually have three or four other stations depending on how many kids are in the classroom, and you really want to keep those groups to about four kids. If you're looking at a class size of around 20, you really need at least 4 computers, or I'm sorry, 5 computers. If you have between 20 and 25, you really do need 5 or 6 computers to make your classroom work with everything we're supposed to integrate, and with centers, and getting the kids, meeting with the kids for

guided reading and things like that. You really do need a strong student to computer ratio."

When asked about the benefits of additional computers in the classroom, specifically a 1:1 computer to student ratio, every participating teacher expressed an interest and thought students having their own computer would aid in classroom instruction. Participant 14 states, "I would have a computer for every child if I could design my own technology based classroom. Right now it's a little more difficult because we are sharing with other classrooms." This excitement was also echoed by Participant 5 and Participant 11 when commenting on the idea of a 1:1 computer to student ratio, "Each student would have their own laptop… fully loaded of course. 1:1? I think that would be great. Every kid could have a laptop."

However, some teachers were skeptical about the feasibility of technology access and 1:1 computing due to recent budgetary concerns. Participant 3 noted that sometimes resources used by teachers are free at first, but next time teachers try to use frequented sites it has changed to "$15 a month … that's definitely a barrier we run into." Other teachers worry there is not enough "money and resources … to go to [technology-related] workshops." Participant 15 summarizes the mind-set of most teachers regarding the financial aspect of technology access when she states, "I would love to have more computer access. The only thing that's standing in my way is money."

One of the goals of the technology team formulated in cycle II was to provide teachers with the access to the latest technology innovations available at Holly Elementary School. Even though there were limited finances available for technology purchases, the technology team was able to purchase a few "small ticket" items and

distribute them throughout the school. The purchase of Skype technology for every classroom teacher was an affordable innovation and it was met with encouraging responses. Skype enabled the teachers and students to utilize digital media and environments to communicate and work collaboratively with students inside and outside of the district. With Skype, the teachers and students could connect face-to-face with anyone, or any classroom, in the world for free. When asked about the Technology Team's efforts to improve technology access and the implementation of Skype technology, Participant 3 stated,

"I definitely like the idea of the tech team. I think it's a good idea for us to learn different aspects of technology and bring them back to the group to teach it ... I think that was a great opportunity for me as well as everybody else because I actually learned a lot more too. If we do that and we actually have little mini workshops, like district workshops, I think that would be really helpful. If everybody with the Skype cameras came in and just taught people about Skype, that would be great."

To address the problem of limited access to technology, cycle III of this action research study put into effect the purchase of a mobile laptop cart. Reacting from data collected during cycle II, the researcher determined the teachers at Holly Elementary School wanted enhanced access to new technologies; this included a 1:1 computer to student ratio. Good fortune and timing was a significant factor in the development of cycle III. Holly Elementary School was awarded $13,333.00 for the purchase of technology related items for the 2010-2011 school year via e-Rate funds (see Appendix F). The researcher approached the principal at Holly Elementary School with cycle II's results and offered a proposal to use the E-Rate money for a 1:1 computer to student ratio

solution in 3rd grade. In the summer of 2010, a laptop cart housing 24 Dell Netbook computers was purchased and placed in a third grade classroom, with the understanding that the four 3rd grade teachers would have equal access to the laptop cart.

The implementation of the laptop cart in the 3rd grade classroom was a success. All four 3rd grade teachers praised the introduction of the laptop cart into their instructional setting. When asked if the introduction of the laptops has improved the instructional practices in the classroom, Participant 8 stated,

"…the kids are really very focused when they're on them. They love the idea of being at their desk and having their very own laptop. It's like a big deal for them, so they're very engaged when it's working. They're very engaged, and yeah, I think it actually – yeah, because there's a few kids that when I'm up there talking, I just lose them, but when they're with that [the Netbook], they're very good."

Similarly, when asked how the introduction of the laptop cart into the classroom improved her instruction, Participant 17 stated,

"Well, I think that there are so many great things about it [the laptop cart] because it lets the kids work on their level, which is huge, independently. I think that's huge 'cause that's the biggest challenge of a classroom teacher to meet everybody's individual needs. So they can all be doing something different but doing the same thing. They're motivated. They love it. It's something they almost see as a treat."

Despite the fact that all 3rd grade teachers agreed the implementation of the laptop cart was a success, even the most successful initiatives are not without their drawbacks. Participant 7 brings clarity to this statement by saying,

"I use it but I have to be honest, I haven't used it instructionally. I do it more as a supplement, like have them [students] go on and practice multiplication … things of that nature. Sometimes it's a little overwhelming when they're in here."

Echoing the sentiments of Participant 7, when describing one of the disadvantages of the new technology, Participant 17 posits,

"…sometimes when we are doing an activity and the next thing is they're allowed on the Netbook when we are finished, some kids are not finishing, but they are going on the Netbook [anyway]. So I have to micromanage certain kids 'cause they're not mature enough yet to recognize that they have to do 'A' in order to get to 'B'."

The addition of more technology and additional computers does not automatically translate into successful technology integration. With the addition of the laptop cart in 3rd grade, Holly Elementary School now has three laptop carts. The other two laptop carts are housed in 4th and 5th grade classrooms. Unfortunately, not all of the laptop carts are utilized to their full potential. As with the 3rd grade cart, the other two carts are housed in individual classrooms.

Teachers have the ability to move carts from one room to another giving their students the ability to have individual computers at any given time. The carts, however, are rarely moved. Instead, teachers send students from one room to the other to grab the required number of laptops for the current classroom assignment. Even though the majority of respondents stated they would like all of their students to have their own computer, rarely are the laptop carts used for 1:1 computing except by the teacher housing the laptop cart in his/her classroom.

Training. It is essential for teachers to have access to a variety of professional development activities including workshops, on and off-site courses, and before and after school training sessions (Cole et al., 2002). These types of opportunities provide teachers with a vision for technology integration and a model for technology implementation, demonstrating the process of teaching with technology. It might benefit districts to use in-house peer mentors to design and teach workshops or utilize an alternative program such as technology coaches (Sugar, 2005). This would guarantee a connection between the trainer and the trainee, as well as providing firsthand knowledge of district and local school initiatives.

Examining the four sub-categories for extrinsic influences on technology integration at Holly Elementary School, the need for more technology-based professional development training emerged as a major concern of most respondents. Fourteen of the 17 teachers responding to the qualitative survey or interviewed by the researcher felt the district's technology initiatives have been outstanding and feel they are lucky to be in a district that offers so many technological innovations for the classroom. However, some teachers believed the district needed to provide more professional development training to utilize the district's technology to its fullest potential.

Participant 5 expressed the view that the district provided technology, but didn't provide enough technology training when stating, "I also feel at times the district gave us this awesome technology without the proper training to use it. I wish I knew more about it in order to use it to its full potential."

Agreeing with her co-worker, Participant 9 stated,

"The recent technological initiatives have been revitalizing the classroom, but also overwhelming. Too many initiatives are being introduced at one time, without the proper training or time to allow for understanding. There was not enough training for the new math program, or the new book program. I am sure that there are numerous ways I could use these programs, but I have not been given the adequate training."

Participant 12 suggests the teachers would benefit from additional technology training and the district would benefit by including teachers in the planning processes for future technology initiatives. Participant 12 states,

"I feel the district is very aggressive with technology integration. As a result, things are rushed. For example, over the summer a SMART Board was placed in my room, leaving me no chalkboard space at all. However, I received minimal training. The training I did receive was done over the summer on my personal time. I, all of a sudden, had this big, white elephant in my room and was at a loss as to how to utilize it."

One of the revelations of cycle I was the realization that teachers did not feel they had enough input when it came to the implementation of technology-based initiatives. Even though many of the teachers at Holly Elementary School believe the school district "strives to be at the top of the technology curve," they feel as though they have little input with regard to new initiatives and their implementation. This sense of disconnect with the district's strategies regarding professional development training for technology initiatives can lead to irritation and frustration. These emotions were clearly implied by Participant 14 when she stated, "Teachers are expected to utilize all technological changes with minimum training. Without in depth training we are only scratching the surface of what we can accomplish."

Not all teachers at Holly Elementary School are at ease with the integration of new technologies. This could be due to the fact that technology is a relatively new concept in education and educational technology is always evolving. Technology integration has placed yet another demand upon teachers who are already stressed by numerous requirements and obligations. However, it can be concluded that teachers will become more comfortable with technology initiatives over time, as existing teachers acquire technology experience on the job and new teachers bring technological abilities to the position.

In cycle II the formation of the technology team sought to provide teachers with a platform for the exploration and implementation of technology initiatives at Holly Elementary School. The goal of the technology team was to create learning communities with which teachers could acknowledge and anticipate various technology difficulties in the school. Another objective of the technology team was to offer teachers an environment in which to develop new strategies and skills to overcome a variety of barriers (Ertmer, 1999) before encountering them in the classroom.

The initial formulation of the technology team was a success. Thirteen staff members volunteered to be a part of the group. There was much excitement and anticipation surrounding the formation of the technology team. Unfortunately, enthusiasm for the cohort started to fade as the school year progressed. Due to time and scheduling constraints, attendance for the technology team meetings became sporadic after the initial two meetings. Additionally, budgetary concerns limited the ability of the members to attend outside professional development opportunities and workshops. Participant 8 reiterates this point when describing the benefits of offsite workshops,

"More in-services, which right now is going to be a difficult task, but simply more in-services, getting us out. The one workshop I went to was incredible and I use everything, so much of what I learned from that one day workshop, and I've incorporated it in to the classroom, but just one day is only the tip of the iceberg, especially for the SMART Board."

Many of the Holly Elementary School teachers joined the Technology Team in hopes of attending workshops to improve instructional practices in their classroom. Classroom teachers were also starting to recognize the amount of work involved with the implementation of the new reading series that started at the beginning of the school year. Once again, the lack of time and the feeling of being inundated by other curriculum concerns affected the ability of the teachers to successfully integrate technology.

Support. For the purpose of this action research study, technology support is identified by the absence or presence of human resource support personnel (e.g. technicians, computer specialists, librarians, and administrators). If teachers are expected to utilize and integrate technology into their classrooms, multiple levels of support are needed, including training by the way of professional development, administrative assistance with planning, scheduling and time to implement initiatives, technical hardware and software training, on-demand help when problems arise, and instructional assistance incorporating technology into instruction. If teachers are given the proper technical support, it will allow them more time to explore new technologies.

The fourth sub-category of extrinsic influences on technology integration at the Holly Elementary School is support. Only a few respondents cited common technical problems and the lack of an onsite tech repair person as barriers to successful technology

integration. "No Internet access, poor electrical connection, and connection problems" were the most notable support issues expressed by the teachers. These technical glitches, routine and ordinary problems for a technology person, can create a certain level of frustration, stress, and even fear for the less tech-savvy teachers. Participant 14 explained the need for more onsite support, as well as the anxiety that can exist when the proper technical support is not available, when she stated,

"Currently, we only have one technology teacher, and one support person to commit to the school every 10 days or so. If teachers are going to use technology, they need to know that if they are ready to present a lesson and there is a problem, we have someone on hand to help. Teachers become frustrated when they spend so much time planning a technology rich lesson only to have a glitch prevent them from sharing it with the students."

Interestingly, participating teachers had more opinions about technology support when responding to the qualitative survey in cycle I than they did in the one on one interviews in cycles II and III. This led the researcher to conclude that teachers might have been uncomfortable talking about technology support issues to the researcher whose current role is the school's Technology Specialist. Understanding and acknowledging the biases that surround the issue of technical support allows the researcher to analyze data that has been collected throughout the study, as well as make assumptions about undiscussable issues (Argyris, 1990), information not being shared due to the relationship the researcher shares with the participants.

The objective of the transcendental phenomenological researcher is to get a fresh perspective of the phenomenon and to see it through a new and innovative lens. It is

essential for the phenomenological researcher to "bracket off" prior experiences of the phenomenon so the views of the researcher do not mix together with the sentiments of the participants. Due to the fact that technical support was one of the main responsibilities of the researcher, the ability of the researcher to observe the issues surrounding technical support from a fresh perspective was imperative. Acknowledging the biases surrounding the issue of support is important for the validity of the study and will be discussed in depth later in this chapter.

Since November of 2000, the researcher has been the Technology Specialist at Holly Elementary School. Throughout that time, the role of the Technology Specialist has changed. During the researcher's first few years of employment, the primary responsibility of the Technology Specialist was to assist the classroom teacher with the integration of technology into the content areas. For example, if the teacher was studying the Solar System in the classroom, the job of the Technology Specialist would be to assist the teacher with the creation of a travel brochure using Microsoft Publisher. The brochure might depict some of the attractions our Solar System has to offer. The position of Technology Specialist was designed as a co-teaching position and the computer lab was a collaborative environment.

Over the last few years, the technology being introduced into the HTSD has started to multiply dramatically. All classrooms are now equipped with projectors and SMART Boards. Both the math and language arts curriculum have an extensive online component. Grade books have become electronic and are available online. The schools and the district have gone "green," which places more emphasis on the school and district websites. With all of the changes in the technology landscape at Holly Elementary

School, the job responsibilities of the Technology Specialist have also evolved. The responsibility of the Technology Specialist has shifted from instruction, assistance, and technology integration to one of purchasing, technology maintenance and assistance, and instruction. Similarly, the duties and responsibilities of the classroom teacher have changed.

Additional tasks, as well as new initiatives, have placed more time constraints on the already demanding schedules of the classroom teachers. This paradigm shift has caused the classroom teacher to take on additional responsibilities with regard to technology integration in the classroom and in the computer lab. It has also caused a level of uncertainty surrounding the duties and responsibilities of the classroom teacher and the Technology Specialist with regard to incorporating technology into instruction, especially for the period of scheduled computer lab time.

There is also an anxiety for the classroom teacher that comes with using technology for instruction, especially in an unfamiliar environment like the computer lab. As expressed earlier by Participant 14, there is a fear that technology infused projects will encounter "glitches" that can undermine carefully thought out lessons. If the classroom teacher knows the Technology Specialist is going to be in the computer lab for direct instruction, or for support, it takes away the fear and apprehension of using technology in the computer lab and in the classroom.

Another explanation for the uncertainty surrounding technology-based lessons between the Technology Specialist and the teachers is that the classroom teachers are unaware of the overall duties and responsibilities of the Technology Specialist. An example of this would be the lack of collaboration when planning and teaching

technology-based projects in the lab. Rarely do teachers contribute ideas, plans, or act as the lead instructor during their scheduled time in the computer lab. This leads the researcher to believe there is little ownership or importance placed on the technology-based projects created in the co-teaching environment of the computer lab by some of the teachers at Holly Elementary School.

The aforementioned behaviors can be caused, and even explained, by the influence of one or more of the extrinsic barriers discussed in this chapter. On the other hand, communicating the duties and responsibilities of specialists might be the duty of a school or district administrator. Furthermore, the position of Technology Specialist is unique in that the Technology Specialist reports to two administrators. As an administrator, the Director of Technology conducts monthly meetings with all district Technology Specialists, plans and implements professional development initiatives, provides technical support, and oversees the purchases and implementations of all technologies in the school district. However, it is the individual school principal that oversees the day-to-day responsibilities of the Technology Specialist. The building principal is also charged with the observation and assessment of the Technology Specialist. This unique dichotomy, which is efficient most of the time, can lead to mixed messages and confusion with regard to the duties and responsibilities of the Technology Specialist. Potential recommendations to resolve these barriers to successful staff collaboration will be addressed in the following chapter.

While some of the inhibitors to successful access to technology at Holly Elementary School involved extrinsic barriers like the expansion of class sizes, budgetary concerns, scheduling limitations, or physical restrictions (like the inability to move a

laptop cart), others have more to do with intrinsic barriers resembling teacher pedagogy and teacher efficacy issues. Teachers may or may not be aware of such barriers, yet current research suggests these barriers are common among teachers. The researcher will take a closer look at these intrinsic influences on successful access to technology in future sections, as well as how a modification of the Technology Specialist's role can limit the barriers inhibiting teachers from using available technologies.

Intrinsic Influences

While studying the barriers and supports regarding the use of technology in the classroom, Wood, et al. (2005), suggest that technology integration must be examined from the teacher's perspective in order to determine the variables that are most influential for the implementation of technology. Wood and colleagues utilized thematic coding of teacher's responses to present an overview of the variables needed for the successful implementation of technology. Computer location, available support, curriculum demands, and student characteristics were among the external variables. Variables specific to the instructor included the teachers' comfort with technology, training, teaching beliefs and practices, and feeling regarding technology and change. When discussing the importance of technology integration, Wood and colleagues believed "the teacher is key to our understanding of what is currently happening within schools" (p. 203).

Teacher beliefs. While previous research has documented the relationship and impact of the pedagogical beliefs of teachers regarding classroom instruction, little is known about how these beliefs influence the integration of technology (Buchmann, 1987; Lumpe, Haney, & Czerniak, 2000; Wozney, Venkatesh, & Abrami, 2006). Depending

upon their definition of technology integration, teachers tend to use prior beliefs, experiences, and attitudes about learning and teaching to develop their philosophy of using technology as an instructional tool (Ertmer, 2005, McGrail, 2005). The teacher's feelings and thoughts about technology will influence how they incorporate it into their instructional practice. Educators must see the benefits of technology as an instructional instrument and be receptive to utilizing computers as a cognitive tool prior to successful classroom implementation. Teachers ultimately determine when and how computers and other types of technology are used (Mercer & Fischer, 1992).

Other researchers have acknowledged inconsistencies between instructional practices and teachers' beliefs (Fang, 1996; Kane, Sandetto, & Heath, 2002). Even though most teachers identify themselves as having a constructivist approach toward technology integration, in reality their implementation process can be described as more of a "mixed method" approach. Sometimes students practice skills and work on isolated facts, and other times students engage in content based, authentic class work (Ertmer, 2005). Teachers reference curricular requirements or exterior pressures from administrators, peers, or parents for the inconsistencies in their method of integration.

Throughout the review of current literature, the researcher found that technology in education is changing rapidly. Many teachers may feel as though they never truly master technology integration in the classroom (Wood, et al., 2005). They find themselves in a permanent role as a learner, with the belief that they will never become an expert. For this reason, the researcher sought to ask teachers how their views of technology have changed in recent years. Most teachers stated that their views of technology have changed for the better. Participant 3 stated, "I have always been excited

about the integration of technology in the classroom, if anything I feel more comfortable using it daily due to practice." Echoing those thoughts, Participant 8 offered, "I have always felt that using technology in the classroom was a great benefit to the learning process. I have become more comfortable using all aspects of technology. I use technology on a daily basis throughout all subjects and numerous times a day." Similarly, Participant 6 expressed, "Honestly, I remember feeling so intimidated by technology. Through training and classroom use, I've become more comfortable. I have always been enthusiastic about technology in the classroom." Taking the description of classroom integration to the next level, Participant 14 explains how she utilizes technology to motivate her students,

"I think of using [technology] in any way for engaging the kids into a lesson that will interest them, anything new … I use the SMART Board all the time to not only engage the kids in to lessons, but to make almost every lesson interactive where the kids can come up and actually help me out with lessons. I use it for centers. I use the computers for everything from research to playing games, interactive educational games, to communicating with other parents, staff."

Similarly, Participant 17 uses multiple forms of technology throughout her day and reiterates Participant 14's philosophy regarding student-centered classrooms:

"It enhances learning, gives me extra things to use, resources for the kids. I can communicate with parents via e-mail. I mean, I hate to say this because I don't know how I feel about it, but it kind of keeps you connected to certain things, and if you're not using your computer, you feel disconnected. I think that it needs to be kid-centered. I think the kids know way more than we think they know, and I think that they can

probably teach us. I'm telling you, the kids in my class last year in May, we figured out how to work that SMART Board because the training was limited, and I think that it was just – I think to get the kids involved in it as much as you can. They can teach each other. They can teach us."

Other teachers were quick to point out that technology, while it has its "benefits," should not be confused with actual teaching. "Computers cannot, and should not, replace teachers," Participant 12 explained. "Yes, [technology] has its benefits, but I think replacing teacher/student time with computer/student time has been ineffective. A computer cannot replace the creativity and dynamics of a good teacher."

Participant 10 concurred by stating,

"I feel that technology should serve the curriculum not the other way around. While I enjoy the use of technology, I feel that it must always justify itself and should strive to be authentic and relevant to the learning experience I am structuring for my students."

Still other teachers are noncommittal, understanding the benefits of technology integration, but apprehensive of the importance placed on technology initiatives. Participant 6 explains,

"HTSD is definitely one of the more progressive districts regarding technology, which is both good and bad. Good - because this is the direction the world is taking and we need to prepare our children. Bad – sometimes I think technology is viewed as more important than other aspects of education (e.g. class size, teachers, instructional associates, and special education programs).

Alternatively, some classroom teachers remain uncertain about incorporating technology into their teaching practices; many of these teachers believe that the time for technology integration in the classroom has passed them by. This point is clearly explained by Participant 7 when she states,

"I'm a dinosaur. I don't do Facebook. That's all they ever yell at me at the gym … I'm not on Facebook. I don't know how to do Facebook. I don't understand Facebook. I don't have any desire to do Facebook."

Teacher Efficacy. For incorporation of educational technology to be a viable method of classroom instruction, the teacher must believe in his/her own abilities to successfully act upon those beliefs. Self-efficacy is defined as, " people's judgments of their capabilities to organize and execute the courses of actions required to attain designated types of performances" (Bandura, 1996, p. 391). Studies have shown a link between high self-efficacy on the part of the teacher and positive student performance (Watson, 2006). Previous research has also found a link between negative student performance and lower levels of teacher self-efficacy.

When asked about the teacher efficacy, Participant 3 summarized the anxiety that is associated with technology integration and offers a potential resolution to the problem when she suggests,

"I definitely like the idea of the tech team. I think it's a good idea for us to learn different aspects of technology and bring them back to the group to teach it, just like I taught EnVision last year. I think that was a great opportunity for me as well as everybody else because I actually learned a lot more too. If we do that and we actually have little mini workshops, like district workshops, I think that would be really helpful. I

think that the biggest problem with technology are teachers who are kind of set in their ways or a little scared of it. I think that having those workshops might pull them out of their scared zone. For example, we were using laptops at a meeting we were having the other day, and one of the teachers was having a really difficult time with it because she had never used a laptop before. Something like that where if we got laptops, somebody took them and said, 'Okay. If you want to attend the workshop, come learn about these laptops.' maybe it would be something that more people would do in their classroom because I don't think everybody uses technology as much as they could. They're scared of it."

The constantly changing world of technology over the past decade has generated the need to help teachers harness the power of technology as an instructional tool. As the use of technology in schools grows, so has the need to facilitate the uses of technology that will eventually lead to increased student learning (Ertmer, 2005; Watson, 2006). The rapidity of the changes in technology has left teachers feeling ill-equipped and unqualified about integrating technology into their instructional practices. To facilitate an environment for positive teacher efficacy with regard to technology, a climate must exist to allow teachers to experiment with technology without the fear of failure (Bitner & Bitner, 2002). As with any new initiative, some degree of failure is inevitable. Fullan (2001) refers to this decline in performance as an "implementation dip" and our schools experience a dip when requiring new skills and new awarenesses. Teachers must be made to feel that they can make mistakes with technology in the classroom without repercussions or derision from students, peers, or superiors.

Limitations of the Study

This qualitative action research study (Hinchey, 2008) focuses on educational technology integration in an attempt to create a collaborative process that fosters a mutually beneficial environment for the school district, the school, its faculty, and the students. Qualitative research seeks to investigate social or human problems by exploring their meaning through individuals or groups of people (Creswell, 2009). Qualitative research uses interviews and other forms of data collection, most often collected in the participant's environment, to analyze and interpret the meaning of the data. The researcher has held the role of Technology Specialist at Holly Elementary School since November 2000. During that time, the duties and responsibilities of the Technology Specialist have evolved, much like the technology itself.

One of the anticipated limitations to this study was the researcher's ability to overcome the past and present typecasts that encompass the Technology Specialist position. Fullan (2007) suggests that "when relationships develop, trust increases, as do other measures of social capital and social cohesion" (p.52). The validity of the data collected for this study ultimately relied on the existing relationships created with the staff and how the researcher continued to nurture those relationships as a participant and observer throughout the study.

Another limitation of the study was the constant issue of time, or the lack of time. The classroom teachers at Holly Elementary School are so restricted by their schedules that they have very little time to focus on district technology initiatives. According to the district contract, all teachers are granted a 30 minute per day time period to plan, develop, and prepare for lessons. In fact, on days when teachers have art, gym, or music, teachers

are given a 45 minute period of time to prepare for future lessons. Teachers do have non-instructional time at the beginning and end of each day, but that time is usually expended in meetings, fulfilling morning and afternoon duties, or supervising students. Unfortunately, the development of technology infused projects requires teachers to search out resources not readily available to them. Additionally, existing technology infused lessons, available in-house or on the Internet, usually require modifications by the teacher before incorporating the technology element into their instruction. All of the aforementioned actions require time, and time for the classroom teacher is in limited supply.

Conclusion

Teacher convictions and doubts about the process of technology integration into classroom instruction have a major influence on the degree to which the teacher applies technology in the classroom. (Becker & Ravitz, 2001; Ertmer, 2005). Teacher paradigms, as well as school district and local school specific issues, can create barriers that inhibit the incorporation of new technology (Ertmer, 1999; Judson, 2006; Watson, 2006). In the course of collecting and analyzing data, the researcher was able to identify the intrinsic and extrinsic influences affecting successful technology integration, how classroom teachers cope with these extrinsic and intrinsic influences, and how the aforementioned pressures affect technology integration in the HTSD, specifically at Holly Elementary School.

The key extrinsic influence on technology integration, identified by the participating teachers, was time. Every respondent to the qualitative survey, as well as the participating teachers who agreed to be interviewed, cited the lack of time as a major

barrier to the incorporation of educational technology in the classroom. Due to a strict schedule that offers limited flexibility for collaboration, preparation, and support, teachers are inhibited to plan, develop, and create technology infused lessons. As a result, technology resources are seldom used to their fullest potential.

It is essential for teachers to believe in the benefits of a technology before incorporating it into practice. Therefore, a major intrinsic influence identified during this study was the limited extent to which teachers believed they contributed to the district's technology initiatives. The perception of the classroom teacher is that the planning and implementation of district initiatives are conducted and fulfilled without the consideration of the teachers. Technology is purchased and placed in their classroom, and the teachers are directed to incorporate it into their instructional practices with little time for training and planning. This sense of disconnect can cause frustration and resentment in the hierarchy of the HTSD, in addition to inhibiting the successful integration of technology into classroom instruction.

Looking forward to the next chapter, the researcher will examine the findings presented in this chapter to determine the effect of my change initiative at Holly Elementary School. As well as focusing on the implications of the study, the researcher will also provide a self-assessment with regard to the current status of the researcher's leadership platform and the modifications made to that platform throughout this study. Furthermore, the researcher will reflect on the original research questions to determine the success of the action research study. Additionally, the researcher will examine what was learned throughout the change process and if the study was successful in answering

the research questions offered at the outset of the research project. Finally, the researcher will make recommendations for future research.

Chapter V: Conclusions and Implications

The term "educational change" describes a wide range of political, economic, educational and cultural tendencies that shape who we are, what we do, and how we go about doing what we do. From business to education, from crime prevention to medicine, change is universal and continuous. Educational change has become one of the most popular catch phrases of the 21st century. In the context of kindergarten through twelfth grade education, change encompasses every part of an educator's daily life. Schools and school districts are driven by change, and change is driving education in different directions. Understanding change is not only important for educators – it is a necessity.

With that in mind, the educational leader must be able to assess the needs (and wants) of the community, the school, and the students. How do programs and resources change the role of teachers and their teaching styles? How can technology enhance the day-to-day operations of the classroom and school? How can we, as school leaders, improve the quality of teaching and student learning?

To answer these questions, educators need to understand change and its impact on the community and the school. Too often, schools and school districts purchase math, science, and reading programs that are ill-conceived or are not utilized to their utmost potential. Purchasing high-end computers, printers, interactive white boards, and videoconferencing equipment does not guarantee the equipment will be used or used correctly. School e-mail and Internet access are invaluable tools for communication, teaching, and learning, but more times than not, they are not used for school related business.

The following chapter will focus on the significance of the study of first and second order influences on technology integration. Simply stated, why does this research study matter? Furthermore, the researcher will examine the research questions asked at the beginning of the study to determine if the research study met its objectives. Additionally, the researcher will investigate the successes, as well as the shortfalls, of the study and how the researcher plans to follow up his research. Finally, the researcher will take a closer look at what was learned throughout the change process, as well as detailing the significance this action research study had on the researcher's leadership platform.

The Significance of the Research

At the conclusion of any research project, the logical question that needs to be addressed is: why does this research matter? As educational leaders, teachers, and pioneers into the 21st century of globalization, it is essential to have a clear vision of the change process needed to create a successful learning environment. This vision must be shared and supported by all stakeholders. Only then can educational change have a powerful effect on the classroom environment and alter the relationship between teachers, learners, and the global community within which we all operate.

To understand how teachers use technology in the classroom, the researcher utilized the action research model to conduct a participatory-based study at Holly Elementary School in the Huntington Township School District (HTSD). This qualitative approach to research involved multiple stakeholders. The focus of this action research was not only the change initiative in the local school context, but how that local change initiative can affect society at large. Although numerous studies have been conducted that focus on the barriers and supports to successful technology integration in the

classroom (Becker & Ravitz, 2001; Cuban, et al., 2001; Dexter, et al., 1999; Ertmer, 1999; Judson, 2006; Strehle, et al., 2001; Sugar, 2005; Wood, et al., 2005), relatively few had researchers who focused exclusively on *how* teachers used technology and *why* they used it in the way they did, regardless of the extrinsic and intrinsic factors persuading successful technology integration.

According to Bitner and Bitner (2002), "Before technology can effect change in the classroom, those ultimately responsible for the classroom must be considered. Teachers must learn to use technology and must allow it to change their present teaching paradigm. This is not an easy task because change can seem intimidating and threatening" (p. 95). Before teachers can incorporate technology and use it as an effective tool for instruction, it is "imperative that they possess practical strategies for circumventing, overcoming and eliminating" (Ertmer, 1999, p. 50) barriers that inhibit technology integration.

Opting to view the phenomenon of technology integration through a transcendental phenomenological lens (Creswell, 2007) and focusing exclusively on classroom teachers offered the researcher an enhanced understanding of the relationship between extrinsic and intrinsic barriers and supports for technology integration at Holly Elementary School. During the three action research cycles, the researcher was able to understand the teachers' perceptions of the district's technology initiatives. As with many school districts in the country, the HTSD is an example of Mintzberg's Professional Bureaucracy (As cited in Bolman & Deal, 2003). There are a limited number of managerial levels between the classroom teachers and the district administration. For the most part, instructional initiatives taking place in the classroom

are conceived at the district administrative level and put into practice at the individual school level with limited input from the teachers. Similar to most educational initiatives, technology initiatives are usually hierarchical in nature and tend to employ a top-down implementation procedure. As noted in cycle I, this lack of input and "buy-in" on the part of teachers in the classroom can inhibit successful technology integration, and can become a source of frustration, dissatisfaction, and resentment among teachers.

Additionally, as the need to incorporate technology into schools develops, so does the necessity to design a process of technology integration to promote student achievement. The development and implementation of technology related proficiencies can leave teachers feeling apprehensive, anxious and unprepared about technology integration. In cycle II of this action research study, the formulation of the technology team aimed to provide teachers with a collaborative environment for technology exploration and implementation at Holly Elementary School. This smaller learning community allowed teachers to recognize and predict various technology difficulties. As a result, teachers were able to develop new strategies and skills in order to overcome a variety of barriers and minimize the anxiety and dissatisfaction that can inhibit successful technology integration.

Satisfying Inquiries

This study examines first and second order influences on successful technology integration, how classroom teachers cope with these extrinsic and intrinsic influences, and how the aforementioned influences affect technology integration in the HTSD. Moreover, this study enables the researcher to understand his role as a teacher and a leader, while creating/designing a process of technology integration that takes into

account the needs of all stakeholders. By examining the relationship of first and second order influences on technology integration, this study explores how teachers use technology, their perceptions of the role of technology in the classroom, and their beliefs about effective classroom practice with regard to technology integration. To reveal the values and beliefs that support or hinder the effective use of technology in the classroom, the primary research questions for this study focused on *how* teachers are using technology in their classrooms and *why* they are using it in this way.

This study also addressed the following questions related to the research:

- What are the supports and perceived barriers to technology integration?
- Will staff collaboration enhance technology integration?

Research questions are the motivating force behind any research project because they allow the researcher to acquire greater knowledge regarding the topic being pursued (Creswell, 2009). In the following sections, each of the research questions will be analyzed and evaluated to determine the success of the study.

How Are Teachers Using Technology in the Classroom? The Huntington Township School District (HTSD) provides its teachers with the latest state-of-the-art educational technology devices to encourage diverse student learning styles. At Holly Elementary School, every classroom has at least two desktop computers, an interactive white board, and a projection device. Additionally, both the reading and math series are available online, as is the district's grading and reporting software. According to the HTSD 2010-2013 Technology Plan (Huntington Township School District, 2010):

> Although the teacher's role will continue to move toward facilitator of learning in project-oriented activities, large group instruction will still be a vital instructional

> strategy. The sharing of information from these new information sources within or among classrooms, by both teachers and students, will be facilitated by the presence of large-screen displays, projection devices or collaborative digital whiteboards. Multimedia and collaborative tools will evolve and be easily customized to more effectively capture the interest of students, address their unique learning styles and engage them while they learn (p. 10).

As a testament to the school district, the technology program, and the encouragement of the individual school's administrator, the teachers in the HTSD utilize the technology readily available to them. For example, some classroom teachers feel very comfortable scheduling time for their students in the computer lab and utilizing the lab environment to create technology rich lessons without the support of the Technology Specialist. On the other hand, other teachers are intimidated and uncomfortable scheduling the computer lab or trying to teach a lesson in the lab without the assistance of the Technology Specialist.

Moreover, certain teachers fully incorporate technology into their daily instructional routine, using the Internet and other software applications to enhance their teaching techniques, while other teachers only utilize technology to improve drill and practice, or word processing skills. For example, after the placement of a 24-computer laptop cart into a third grade environment, each teacher with varying degrees of experience and age, only the teacher housing the cart utilized the laptops to create a 1:1 computer to student ratio for whole group instruction. The other three teachers opted to use the laptops in a piecemeal fashion for small group instruction, computer centers,

games, or drill and practice websites. Both time and convenience were cited by the teachers as factors for the way the technology was utilized in their respective classrooms.

Each of the aforementioned factors led the researcher to conclude that teachers utilize technologies to varying degrees and with contrasting levels of proficiency. Intrinsic factors, factors that are within the teacher's ability to control, such as pedagogical beliefs about technology-based instructional strategies, influence the success of technology initiatives. Similarly, external factors such as time, support, training, and access, also contribute to the reduction of technology integration in the classroom. Age and experience have limited influence on whether or not teachers incorporate technology into their everyday instruction.

Why Are Teachers Using Technology the Way They Are? It would be easy to say that certain teachers are more comfortable with technology because they are "digital natives" who grew up in the technology rich environment of a younger generation. Age, however, does not determine the technology proficiency of the teacher. The participating teachers in this study had varying ages and experience levels, ranging from a first year teacher to a master level teacher with over 25 years teaching experience. Many of the experienced teachers felt very comfortable using technology for instruction, while some of the less experienced teachers felt overwhelmed when trying to incorporate technology into a lesson. Age did not appear to play a factor in determining who was at greater ease using technology.

As previously stated, many of the district technology initiatives are developed at the administrative level. Those initiatives are then channeled into the individual schools and into the classroom. Teachers are not always solicited for input or advice prior to new

technologies appearing in their classroom. For example, one of the district's recent technology initiatives was to place SMART Boards, interactive whiteboards, in every classroom in the district. The installation of the SMART Boards took place in the summer. The boards were placed in the front and center of the classrooms, taking up approximately one third of the existing chalkboard. When teachers returned to school in September, many were shocked and angered by the addition of the SMART Board, as well as the placement of the board, which resulted in the loss of their chalkboard.

Although teachers were initially upset by the addition of the SMART Boards, due to the fact that they were not involved in the planning process and had no SMART Board training prior to the installation, the teachers eventually grew attached to dependent upon the new technology. Similarly, when the district revolutionized its grading system by switching to an online grading format, some teachers were upset. Once more, teachers felt a significant change had been made that directly impacted their duties and responsibilities as a teacher, and once again it was carried out without their input or approval. However, as with the addition of the SMART Boards, teachers accepted the new grading program after becoming familiar with the new technology. This autocratic, "do-as-I-say" approach to new technology initiatives appears to be effective in the long term, but as Goleman (2002) recognizes, "of all the leadership styles, the commanding approach is the least effective in most situations."

Ultimately, it is fair to infer that the successful use of technology in the classroom is dependent, in part, on teacher "buy in" to district initiatives and directives. Perhaps the transition from one technology initiative to the next could benefit from increased teacher participation during the planning and development process. A collaborative effort that

addresses the expectations, requirements, and needs of all stakeholders would be the ideal scenario for any district initiative.

Will Staff Collaboration Enhance Technology Integration? The Technology Specialist is considered a "resource person." The role of the Technology Specialist is gradually moving away from the lead provider of instruction to a curriculum support person with regard to technology integration. Conversely, according to the HTSD's 2010-2013 Technology Plan, "The classroom teacher is responsible for delivering a significant portion of the instruction for any given project, with regularly scheduled blocks of time provided in the school's computer lab" (p. 33). In any event, the responsibility of integrating technology into the curriculum, as it is defined by the HTSD, requires a team effort. Lencioni (2002) suggests that trust and confidence in one's peers is essential in building an effective team. He goes on to imply that successful collaboration requires team members to feel comfortable revealing their vulnerabilities to one another.

Fullan (2001) echoes these observations when he suggests that handling people's emotions is the key to managing relationships within an organization. He stresses authenticity when handling relationships, stating that teachers who act insincere and controlling will strike a dissonant chord with their team members. Similarly, Kotter (1996) stresses the correlation between trust, a common goal, and an influential team with the ability to create lasting change. The majority of technology-infused projects are created in the computer lab, and the computer lab is considered a co-teaching, collaborative environment. Therefore, a positive working relationship between the

Technology Specialist and the classroom teacher is an essential element for the successful integration of technology at Holly Elementary School.

Cycle II of this action research study saw the creation of a technology team. The rationale for creating a technology cohort was to establish a smaller learning community to explore technology integration at Holly Elementary School. The learning community explored specific areas of technology integration available to the school. The technology team investigated different technology-based initiatives, as well as the extrinsic and intrinsic barriers that could inhibit the initiatives, eventually showcasing the acquired knowledge to the staff. The staff then provided feedback and suggestions back to the technology team, which were then used to recommend future technology proposals. This reciprocal distribution of information created a self-sustaining and reinforcing feedback loop (Argyris, 1990). Additionally, the formulation of the technology team provided teachers with a voice regarding technology exploration and implementation at Holly Elementary School. Creating smaller learning communities allowed teachers to acknowledge and anticipate various technology difficulties and develop new strategies and skills to overcome a variety of barriers (Ertmer, 1999).

Implications for Future Research

This action research study has the potential to expand on the literature currently available on the topic of technology integration, specifically the areas focusing on the incorporation of technology into instructional practice. While most of the current literature focuses on the access to technology (Becker, 2001; Ertmer, 2005; Watson, 2006) or improving professional development training for teachers (Cole,et al., 2002;

Strehle, et al., 2001), little is known of the implementation of technology-based initiatives and teacher pedagogical beliefs.

Understanding why educators incorporate technology into instruction is essential when trying to design a process of technology integration. Teachers are inclined to use prior beliefs, experiences, and attitudes about teaching and learning when developing their thinking about utilizing technology as an instructional tool (Ertmer, 2005, McGrail, 2005). Educators' emotions and ideas regarding technology will determine how they integrate technology into their instructional practice. Classroom teachers must acknowledge the benefits technology has to offer as an instructional instrument and be receptive to technologies as cognitive tools prior to successful classroom implementation.

Another way the results of this study could be used to promote technology integration beyond the local context of Holly Elementary School is in the field of teacher collaboration. A key component of the innovative U.S. Department of Education's National Education Technology Plan 2010, *Transforming American Education: Learning Powered by Technology* is to empower teachers by creating a model for "connected teaching" (U.S. Department of Education, 2010). The objective of connecting teachers is to move away from the professional autonomy of the "closed door" classroom and promote a collaborative environment that offers educators access to data, resources, and content that will in return support professional growth, teacher empowerment, and, inevitably, student achievement. During cycle II of this research study, the formation of the technology team provided Holly Elementary School with a successful model for connecting teachers at the local school level. Utilizing the diverse and specialized competencies and expertise of various members of the Holly Elementary School staff, the

technology team was able to improve their own instructional practices, and in return, share their expertise with other staff members.

The rapidly changing and challenging demands of our global society demand we work together to redesign our current educational system to create a more efficient, flexible, and effective structure of educational technology (U.S. Department of Education, 2010). Understanding teacher pedagogy with regard to educational technology, in addition to creating social/professional networks that provide educators with professional learning resources and tools, two of the major objectives of this study, are of upmost importance for transforming educational technology in America.

Implications for the Researcher

An essential component when reflecting upon the significance of this study is determining how the research impacted the professional practices of the researcher. The following section examines the current relationship between the Technology Specialist and the classroom teachers, as well as how that relationship has evolved throughout the study. Additionally, the researcher examines the co-teaching environment of the computer lab and the technology rich lessons created in the lab setting. Finally, the researcher explores modifications to the existing computer lab schedule and how those adaptations can enhance successful integration of technology at Holly Elementary School.

Relationships. Historically, the job description of the Technology Specialist is similar to that of most support personnel. In addition to maintaining hardware and software resources, one of the duties of the Technology Specialist is to assist the classroom teacher in the development, planning, and implementation of technology

infused projects inside and outside of the computer lab. However, in reality, the roles of assistant and lead instructor are reversed. At Holly Elementary School, the Technology Specialist is charged with the development, planning, and instruction in the computer lab, while the classroom teacher functions as an assistant. These opposing points of view regarding the management of scheduled technology instructional time has caused an estrangement between the Technology Specialist and a number of classroom teachers. However, the stress caused by the division of ideologies lessened as the study progressed and organizational defense mechanisms were brought into the open and addressed. Nevertheless, additional conversations need to take place to address the lack of awareness surrounding the duties and responsibilities of the Technology Specialist position as it relates to team teaching with the classroom teacher.

Co-Teaching. Technology infused lessons start with ideas conceived in the classroom. Technology is never taught for the sake of teaching technology. In fact, quite the opposite is true. Technology is infused into projects based on core content areas, such as math, language arts, social studies, and science. Currently, collaboration for computer lab lessons takes place via e-mail or casual communication in the hallways. Frequently, the Technology Specialist inquires about what is being taught in the classroom. When the classroom teacher responds to the inquiry of the Technology Specialist, the Technology Specialist then makes a lesson recommendation, along with an appropriate form of technology to use during the lesson. An example of a typical technology infused lesson could be a 5-slide Power Point presentation depicting the characters, plot, setting, and summary of the 5th grade novel, *Number the Stars*.

During the traditional three day scheduled time frame in the computer lab, the Technology Specialist introduces the lesson on day one, students complete the majority of the work on day two, and on day three, students finish and print the completed project. Additional time is not factored into the computer lab schedule. Therefore, missed lab times, whether due to school closures, assemblies, or student absenteeism, become the responsibility of the classroom teacher to make up. Missed lab times are not rescheduled by the Technology Specialist. The reason lab times are not rescheduled is uncomplicated, but it still remains an area of contention between the Technology Specialist and some classroom teachers. For example, if schools are closed on Monday and Tuesday due to inclement weather, the Technology Specialist would have to teach five days worth of classes in a three day period. Even though there may be room on the computer lab schedule to accommodate all of the missed classes, the overload of the schedule would not allow time for the Technology Specialist to perform his other required duties in the school. Because classroom teachers do not understand the duties and responsibilities of the Technology Specialist and believe the job of the Technology Specialist is to be the lead teacher for students in the computer lab, some teachers might see the failure to reschedule missed computer lab time as a poor work ethic on the part of the Technology Specialist.

Scheduling. The computer lab at Holly Elementary School houses 28 Dell desktop computers and a ceiling-mounted LCD projector. The Technology Specialist schedules first through fifth grade classes in the computer lab every fourth week. First and second grade students come to the computer lab during the same week. Before this research study, grades One and two were scheduled to be in the computer lab for two –

35 minute classes. Grades three and four were scheduled for three – 45 minute classes in the lab. Fifth grade was scheduled for three – 60 minutes classes. For the duration of cycle III, and for the rest of the 2010-2011 school year, each of the classes was scheduled for an extra time slot in the computer lab. Theoretically, the Technology Specialist and the classroom teachers were to utilize the additional time in the lab to collaboratively develop and plan for technology infused projects. Moreover, the additional lab time was also to be used as a one-on-one professional development opportunity for the Technology Specialist and the classroom teacher. Unfortunately, the extra time was rarely spent on technology related lessons, or for collaboration. For the most part, the additional time slots, while greatly appreciated by the staff, were utilized as a built-in "make up day" in case of time off due to weather, half days, or missed time due to assemblies. If additional time to schedule the lab is available in the future, an unswerving effort needs to be made by both the Technology Specialist and the classroom teacher to commit that extra period of time to the development and planning of technology rich projects or technology-based professional development. This assurance may require the modification of the proposed lesson, the computer lab schedule, the schedule of the Technology Specialist, or the alteration of all of the above. The outcome of the aforementioned initiatives, however, will address the issue of time, the most cited extrinsic factor inhibiting successful technology integration at Holly Elementary School.

The Change Process - Double Looped Learning

Argyris (1990) compares single looped learning, or learning that solves basic problems, to a thermostat. A thermostat gets placed at a particular setting. The thermostat then turns on the air conditioner or the heater to regulate the temperature. The

thermostat detects a problem and makes a simple adjustment to correct the problem. Like a thermostat, a single looped learning process can only solve presenting problems. Single looped learning cannot address the more basic question of *why* these problems exist in the first place; single looped learning cannot address root cause issues.

In the previous sections, the researcher examined some of the organizational defense routines (Argyris, 1990) that are inhibiting successful technology integration at Holly Elementary School. Organizational defense routines prevent individuals, groups, and organizations from noticing and correcting errors that are embarrassing or threatening because of the following actions: (1) bypass the errors and act as if they were not done, (2) make the bypass undiscussable, and (3) make its undiscussability undiscussable. Organizational defense routines in the HTSD and particularly at Holly Elementary School included the duties and responsibilities of the Technology Specialist and the classroom teacher with regard to scheduling, planning, development, and instruction of technology infused lessons, as well as the professional bureaucracy that binds the implementation of technology initiatives.

The goal of this change process was to develop a process of technology integration that overcomes the aforementioned organizational defense routines by establishing a double looped learning process (Argyris, 1990). As opposed to single looped learning, double looped learning addresses the governing values influencing technology integration (see Figure 5.1). An example of a strategy created to focus on double looped learning was the formation of the technology team. The purpose of the technology team was to provide teachers with a voice regarding technology exploration and implementation at Holly Elementary School.

The existing model for addressing technology related issues at Holly Elementary School is a single-loop learning model. Single-loop learning concentrates on actions and consequences, as opposed to underlying influences. For example, if the school has money to purchase SMART Boards for every classroom, the SMART Boards are purchased and installed with little or no input from the classroom teacher.

A double-loop learning model seeks out the governing variables or base issues that can inhibit successful technology integration prior to the implementation process. For example, prior to the purchase and installation of the school-wide SMART technology, perhaps technology team members could pilot the initiative, assessing the strengths and weaknesses of the new technology before the initiative is distributed to the entire school. The realization of a double-loop learning environment will enable teachers to provide input during the development and planning process of district technology initiatives, thereby dismantling existing extrinsic and intrinsic barriers inhibiting successful technology integration at Holly Elementary School.

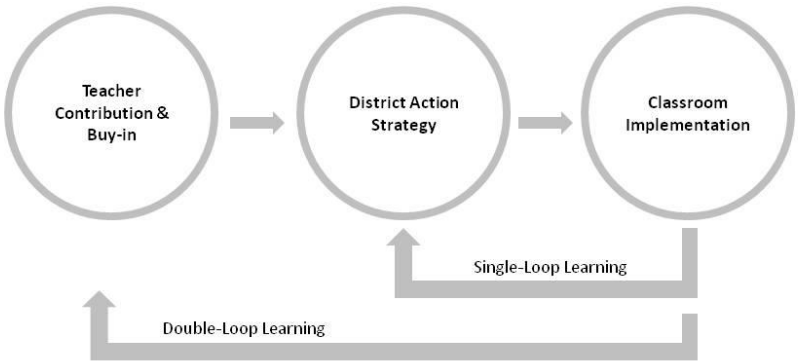

Figure 5.1 Double-loop learning addresses the governing values that inhibit successful technology integration, as opposed to single-loop learning which only addresses actions and consequences (Argyris, 1990).

Leadership

Transformational Leadership. The researcher aspires to be a transformational leader, identifying with the needs of others while providing them with a shared vision or goal. James MacGregor Burns (Cited in Wren, 1995) defines the benefits of transformational leadership when describing the relationship between quality leaders and their supporters when he states:

> Some define leadership as leaders making followers do what followers would not otherwise do, or as leaders making followers do what the leaders want them to do; I define leadership as leaders inducing followers to act for certain goals that

represent the values and the motivations—the wants and needs, the aspirations and expectations—of both leaders and followers (p. 100).

The words of Burns, and his vision of transformational leadership, provided the initial motivation, direction, and structure for the researcher and this action research study. Understanding the needs and wants of the teachers at Holly Elementary School enabled the researcher to modify the existing process of technology integration, and, inevitably, to create a new method of technology integration that took into account the needs of all stakeholders. Examining how teachers utilized technology in the classroom, as well as their pedagogical beliefs with regard to technology initiatives in the district and the school, enabled the researcher to work with the teachers toward one goal: successful technology integration.

The exploration of teacher expectations and beliefs regarding technology integration in cycle I is an example of the researcher utilizing transformation leadership. Cycle I of the action research study began with the distribution of a qualitative open-ended survey. The survey was intended to be a fact gathering endeavor. Using data collected by the qualitative survey, field notes, and teacher observations to gauge the climate and state of mind of the teachers in the HTSD, the researcher explored the needs and wants of the staff with regard to technology integration. In particular, the researcher used cycle I to explore how classroom teachers deal with extrinsic and intrinsic influences related to technology integration in order to develop collaborative objectives for both the researcher and the participants.

Servant Leadership. Identifying with the presumption that a leader needs to follow to better serve the people he leads, the researcher also aspires to be a servant

leader (Greenleaf, 1977). The researcher began his teaching career by observing the teachers with whom he worked. The team-teaching atmosphere of the computer lab allowed the researcher to observe every grade level teacher in the building and study his or her teaching style and instructional practices. Eventually, the researcher started participating in the lessons, contributing more and more as his confidence grew. Ultimately, the researcher became the lead instructor in the computer lab and the classroom teachers assisted with the instruction. Greenleaf (1977) explains that, "The servant-leader *is* servant first… It begins with the natural feeling that one wants to serve, to serve *first*. Then conscious choice brings one to aspire to lead." Taking a secondary role in the computer lab all those years ago was very similar to being a participant observer throughout this study; it enabled the researcher to learn from classroom teachers who have already mastered the curriculum. It also allowed those teachers to identify with the researcher, assess his character, and gain knowledge by collaborating with the researcher in the classroom.

Another example of servant leadership was the introduction of the Dell laptop cart during cycle III of this action research study. Realizing that the integration of the laptop cart into a third grade classroom without additional training or support would cause added stress and anxiety for the classroom teacher, the researcher modified the duties of the Technology Specialist to assure successful integration. Rather than having students come to the computer lab for instruction during their scheduled technology time, the Technology Specialist went into the third grade classrooms and provided classroom instruction using the new laptops. Not only did this small change in philosophy and environment create an exciting and engaging atmosphere for the students, having the

researcher change roles with the teacher and model ideal technology related instructional practices, also served to alleviate some of the fear and anxiety that results from the introduction of new technology into the classroom.

Emotionally Intelligent Leader. Additionally, the researcher strives to master the personal and social competences that encompass an emotionally intelligent leader. The researcher has often been told he has indefinable qualities that inspire people, but these qualities have been difficult to identify. In *Primal Leadership*, Goleman (2002) explains that these intangible leadership qualities are essential skills to inspire, motivate, and encourage others:

> Understanding the powerful role of emotions in the workplace sets the best leaders apart from the rest—not just intangibles such as better business results and the retention of talent, but also in the all-important intangibles, such as higher morale, motivation, and commitment (p. 5).

A significant component of this action research study was the researcher's ability to identify, acknowledge, and reflect upon these intangible leadership qualities throughout the research project. Self-awareness is the ability to have an appreciation of one's strengths and limitations (Goleman, 2002). This form of self-awareness is an essential element for becoming an emotionally intelligent leader.

During the action research study, self-assessment proved to be an invaluable tool for predicting how the researcher would react in certain situations. Learning about, journaling on, and reflecting on inherent leadership qualities and related characteristics helped the researcher recognize when and how to react to different situations that arise within the work day. This knowledge of self-awareness also enabled the researcher to

differentiate the skills needed to act in response to most situations in the field, and guided the researcher to identify with his final espoused leadership theory, social justice leadership.

Social Justice Leadership. An additional leadership principle espoused by the researcher is that of being a social justice leader. Creating an equitable educational environment in our schools requires educators to become proponents of social justice. To fulfill this task and become a social justice ally (Neumann, 2009), school leaders must implement critical change theories in practice and must move beyond passive discourse (Dantley & Tillman, 2010) by promoting acceptance, tolerance, dialogue and striving for democratic freedom (Freire, 2000).

Throughout the researcher's time at Rowan University, many, if not all, of the courses incorporated a component of social justice. The researcher has always been aware of social justice issues in education and society at large, but felt disconnected from such issues, believing he did not have the ability to implement any significant change in his current context.

However, during the third cycle of this study, the researcher executed a technology-based diversity initiative at Holly Elementary School. This five month collaborative effort invited students to explore their family's history, culture and traditions by way of their favorite family foods. By means of family interviews, students investigated family traditions and cultures associated with their favorite "home cooked" meal. Students were also asked to examine the different words, holidays, relatives, stories, and customs related to the meal. Utilizing the computer lab, portable Dell Netbooks, Microsoft Power Point, and the school's website, students created a multi-

sensory, collaborative class project recounting their favorite family recipes, as well as the cultural and historical significance of those recipes.

By offering students the ability to examine and explore their own culture and lineage through an investigation of these recipes, the researcher sought to encourage a level of acceptance, dialogue, and freedom in the classroom. Through the utilization of technology as an instructional tool and the primary medium for students to create their virtual cookbooks, the class created a multi-sensory project that could easily be incorporated into the student's websites and shared with parents, peers, and staff. The project culminated with a multicultural feast shared by students, parents, and teachers. The result was a fun and rewarding technology-rich lesson for the students and a socially conscience, collaborative project for both the researcher and the classroom teacher.

Moving Forward

The logical question that needs to be addressed at the end of any research study is: How will this process continue? Too often, reform initiatives in education "fade out" before the value of the program can be determined. Additionally, it is important for the researcher to reflect upon the entire process, examining the implications of the research on current policy, and well as any effects the research may have on the researcher professionally. In the following section the researcher will detail a plan to extend the achievements of the research study, making note of the accomplishments, as well as the disappointments, throughout the entire process.

At Holly Elementary School, there was a need to understand how the teachers felt about educational technology. There was also a need to examine how teachers utilized technology for instructional purposes in their classroom. By identifying how and why

teachers make use of educational technology in the classroom, the researcher was able to provide the teachers with a collaborative process of technology integration that takes into account the needs of all stakeholders. The extrinsic and intrinsic influences inhibiting technology integration in the classroom are less prevalent when all stakeholders are equally engaged and involved in the development and implementation of technology infused lessons.

Understanding how teachers view technology, technology initiatives, collaboration with peers, and the use of technology as an instructional tool was vital to the success of the research study. The use of one-on-one interviews with participating classroom teachers provided an intimate account of the pedagogical beliefs of the teachers and offered the researcher a glimpse into the hectic daily routine of teachers at Holly Elementary School. Just by attempting to schedule times to meet with teachers for an interview, the researcher gained a better understanding of the coordination and organization it takes to balance the many different facets of a classroom teacher's daily routine. Similarly, the addition of the mobile laptop cart and the subsequent change of instructional venues (teaching in the classroom as opposed to the computer lab) provided the classroom teacher with an indication of what it is like to be a Technology Specialist. During those scheduled instructional times, the Technology Specialist encountered many of the same barriers to successful technology integration that had been plaguing the classroom teachers. It was beneficial for the classroom teacher to see how to deal with, work around, and possibly overcome those obstacles in his/her own work environment without having to delay or terminate the intended lesson.

The modification of the Technology Specialist's schedule, responsibilities, and duties should be the focus of future technology related initiatives at Holly Elementary School. Classroom teachers are locked into their schedules. They have little or no flexibility in their schedules for collaboration, lesson development, and technology training. If teachers are expected to have a vested interest in the planning and implementation of technology rich lessons, the time for support and collaboration needs to take place during the school day, but during a time that does not interfere with the other responsibilities of the classroom teacher. Due to the fact that scheduled computer lab times are considered a co-teaching endeavor, as well as the fact that the Technology Specialist's schedule allows for greater flexibility, it is reasonable to conclude that an augmentation of the Technology Specialist's schedule and responsibilities can provide more time for collaboration, support, and training between the classroom teacher and the Technology Specialist.

During cycle III, the researcher spent a great deal of time in the classroom as a participant observer, as opposed to acting as the lead instructor in the computer lab. As previously stated, this change of environment and glimpse into another educator's work space, as well as the subsequent observation of that teacher's work ethic, benefitted both the Technology Specialist and the classroom teacher. This form of collaboration and team-teaching is already supposed to take place at Holly Elementary School, especially in the computer lab. However, as explained in Chapter IV, the classroom teachers have taken very little ownership of projects created in the computer lab and the Technology Specialist rarely ventures into the classroom for instruction.

To combat the indifference surrounding collaborative technology infused projects, future technology projects could be thematic in nature, focusing on a significant concept investigated by each grade level. For example, a large portion of the third grade curriculum focuses on immigration. In order for students to discover what it was like to come to America as an immigrant, students might research the history of Ellis Island and the symbolism of the Statue of Liberty. Alternatively, a thematic technology-based initiative for third grade could be an immigration project, focusing on diversity, multiculturalism, and family lineage. An assignment of this nature could not be compartmentalized into three 45-minute class periods, nor can it be created or implemented by one teacher. This exciting new technology-based venture would utilize an assortment of available technologies and extend beyond the traditional constraints of lessons in the computer lab and the lab schedule. The success of such a proposal would require a vested interest in the project by both parties and a collaborative effort by the Technology Specialist and the classroom teacher.

The invaluable lesson learned throughout this action research study was that the extrinsic and intrinsic influences inhibiting technology integration in the classroom are less prevalent when both the classroom teacher and the Technology Specialist are equally engaged and equally involved in the planning, development, and execution of technology infused projects. The success or failure of technology initiatives relies heavily on the pedagogical beliefs of the teachers accountable for the integration of these new technologies into their instructional practices. By way of double-loop learning, successful technology initiatives will benefit from teacher contribution and buy-in, as opposed to district decrees and directives. By means of collaborative endeavors such as

the formation of the technology team and the reinvention of the co-teaching relationship between the Technology Specialist and the classroom teacher, previous barriers to technology integration can be addressed and eventually overcome.

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Appendix A

Initial Interview Questions

Thank you for taking part this action research study. This interview is part of data collection for the qualitative research project being conducted at Holly Elementary School. In the course of this study the hope of the researcher to learn more about teacher beliefs regarding technology integration. Your responses will be recorded and all responses will remain confidential.

1. How do you define technology?
2. What types of technology do you use at home?
3. What types of technology do you use at work?
4. What kind of barriers have you encountered when using technology in the classroom?
5. How were you able to overcome those barriers?
6. What kind of supports assist you with technology integration?
7. If you could create your own classroom, what would your ideal technology infused classroom look like?
8. What is your future vision for educational technology at Holly Elementary School?

Appendix B

Coding Outline

1. Pedagogical Technology Beliefs - **PTB**
    a. Teachers – **PTB-T**
    b. Administrators – **PTB-A**
    c. District – **PTB-D**
2. Technology Integration - **TI**
    a. Interactive Whiteboards – **TI-IW**
        i. Barriers - **TI-IW/i**
        ii. Supports - **TI-IW/ii**
    b. Online Grade Books – **TI-OGB**
        i. Barriers – **TI-OGB/i**
        ii. Supports – **TI-OGB/ii**
    c. Mobile Laptop Carts – **TI-MLC**
        i. Barriers - **TI-MLC/i**
        ii. Supports - **TI-MLC/ii**
    d. Digital Curriculum – **TI-DC**
        i. Barriers - **TI-DC/i**
        ii. Supports - **TI-DC/ii**
3. Classroom Instruction – **CI**
    a. Barriers – **CI/i**
    b. Supports – **CI/ii**
4. Site-based Issues - **SBI**
    a. School –**SBI-S**
    b. District – **SBI-D**

Appendix C

Dear Mr. Superintendant,

As you know, I am currently a doctoral student at Rowan University. One of the requirements of the program is the completion of a qualitative research project. I would like to take this opportunity to ask your permission to collect data at Holly Elementary school for this project via staff surveys and interviews. The breadth and depth of this research will be considerable.

Teacher convictions and doubts about the process of technology integration into classroom instruction have a major influence on the degree to which the teacher applies technology in the classroom. (Ertmer, 2005; Becker & Ravitz, 2001). Technology related teacher paradigms, as well as school district and local school specific issues, can create barriers, inhibiting the incorporation of new technology (Judson, 2006; Watson, 2006).

The purpose of my research is to create/design a process of technology integration that takes into account the needs of all stakeholders by indentifying the teacher perceptions and expectations of the Huntington Township School District, while examining the pedagogical beliefs of elementary school teachers with regard to the recent implementation of technology in their classrooms. Through a qualitative research approach I will be able to a) identify the technical skill level of the elementary staff, b) describe the current pedagogical beliefs of the staff with regard to technology integration, and c) identify district, local school, and teacher specific issues that create barriers, inhibiting the incorporation of new technology. I will concentrate exclusively on the technology skill level of the Holly Elementary School staff and the educational beliefs of the staff with regard to technology integration. I would start by distributing a qualitative open-ended survey. The surveys will be circulated to kindergarten through fifth grade classroom teachers at Holly Elementary School.

I aspire to create/design a process of technology integration that takes into account the needs of all stakeholders by indentifying the teacher perceptions and expectations of the Huntington Township School District, while examining the pedagogical beliefs of elementary school teachers with regard to the recent implementation of technology in their classrooms. I appreciate your willingness to give your approval for this project. Thank you in advance for your cooperation.

Sincerely,

Robert Rossi
Technology Specialist
Holly Elementary School

Appendix D

Consent Form

My name is Robert Rossi and I am a doctoral student at Rowan University. I am conducting a research project that focuses on technology and education. Particularly, integrating technology into the K-5 classroom and how that technology impacts the classroom teacher. I would like to take this opportunity to ask you to participate in that project.

Your participation in the research project will involve the completion of a brief technology related survey. The survey is a qualitative technology survey, used to describe the pedagogical beliefs of the teacher with regard to technology integration in the classroom.

Through the use of pseudonyms, I will protect your identity throughout this process and in any future publications or presentations. Although you may be quoted directly in the research process, your name will not be used in any part of the report. All data will be stored in a secure location. Please understand that you may withdraw from the study at any time.

I appreciate your willingness to give your time to this project to help me learn about technology and its impact in the elementary classroom. If you have any question, please feel free to ask. I can be reached at 609 668 7173 or RossiR@voorhees.k12.nj.us.

I have read the above and discussed it with the researcher. I understand the study and I agree to participate.

_____ (Participant Signature & Date)

_____ (Researcher Signature & Date)

Appendix E

Technology Integration Survey

Thank you for taking the time to participate in this Technology Integration Survey. As previously explained in the consent form, this information is confidential and I will protect your identity in any future publications or presentations. The purpose of this survey is to examine pedagogical beliefs of the Holly Elementary School classroom teachers with regard to technology integration in the classroom. Data collected from this survey will assist in the creation of cycle 1 of my research project. Providing comprehensive and explicit information in your answers will provide me with a better understanding of existing technological paradigms, as well as school district and local school specific issues that may inhibit the incorporation of new technology in the classroom.

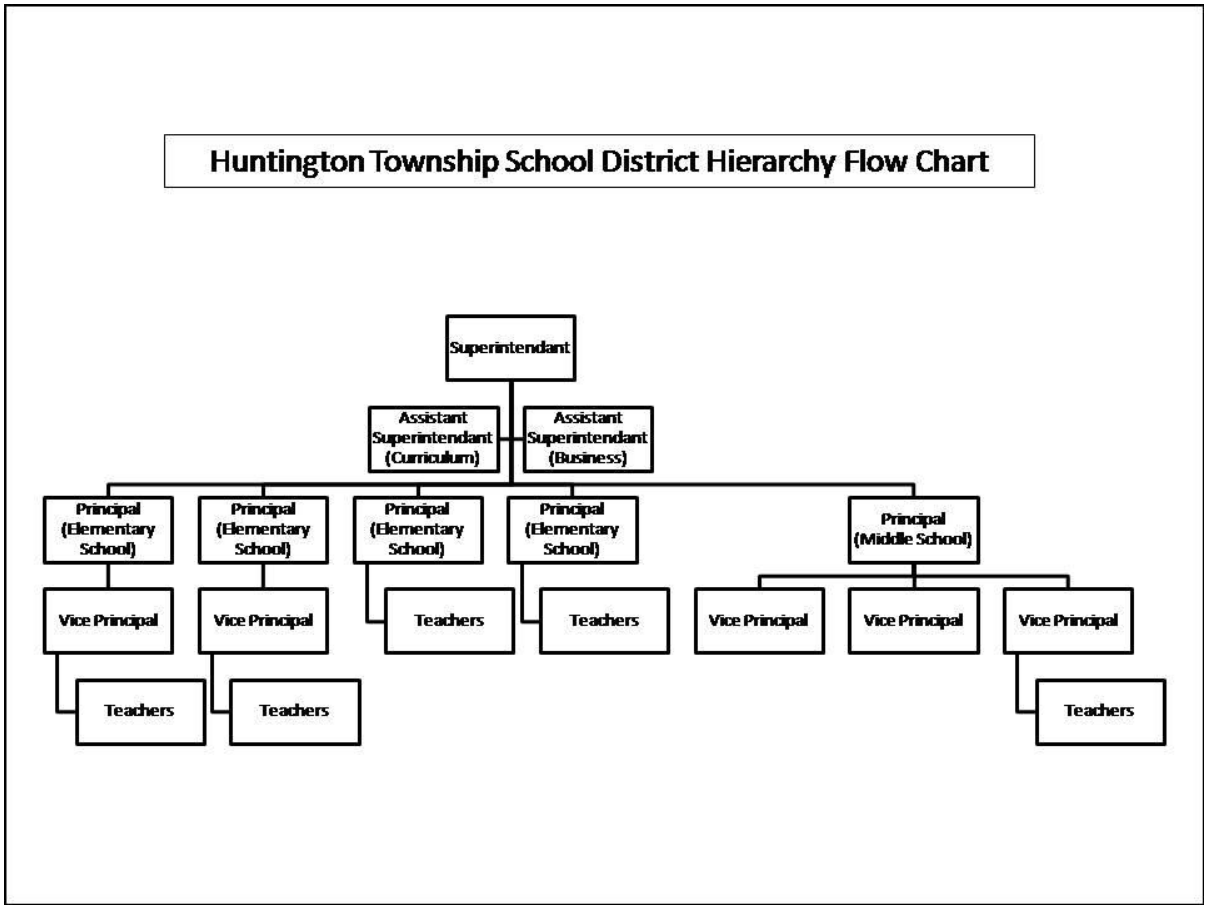
1. *What are your perceptions of the district's recent technology initiatives? How has their implementation changed your classroom practice? Please be specific.*

2. *How have your views of technology integration changed in the past three years? Please be specific.*

3. *What barriers do you see that inhibit technology integration?*

4. *If you could create a technology rich classroom environment, sparing no expense, what would you design?*

Appendix F


Huntington Township School District Hierarchy Flow Chart
Superintendant
Assistant Superintendant (Curriculum)
Assistant Superintendant (Business)
Principal (Elementary School)
Principal (Elementary School)
Principal (Elementary School)
Principal (Elementary School)
Principal (Middle School)
Vice Principal
Vice Principal
Teachers
Teachers
Vice Principal
Vice Principal
Vice Principal
Teachers
Teachers
Teachers

Appendix G

Technology Resource Prurchases 2010-11							
Holly Elementary School							
[redacted]	$ [redacted]						
[redacted]	$ [redacted]						
[redacted]	$ [redacted]						
[redacted]	$ [redacted]						
[redacted]							
			Tech Budget Purchases			Bldg Budget Purchases	
Product	Unit Cost		Qty	Subtotal		Qty	Subtotal
Dell OptiPlex 780 Desktop	$967.41			$ -			$ -
Dell Latitude 6510 Notebook	$ 1,391.00			$ -			$ -
BLUE Dell Latitude 2100 Nethook	$ 620.51		22	$ 13,651.22		2	$ 1,241.02
NComputing U170 (USB Single Virtual Desktop Unit)	$ 90.00			$ -			$ -
SMARTBoard	$ 1,389.00			$ -			$ -
Projector Option 1 Config - All Products + Install	$ 3,228.00			$ -			$ -
Flip Slide HD Camcorder (4 Hrs Video Storage)	$ 315.00			$ -			$ -
Logitech QuickCam Pro 9000	$ 93.25			$ -			$ -
Logitec Folding Headset Microphone	$ 49.75			$ -			$ -
Logitech Desktop USB Microphone	$ 19.00			$ -			$ -
Adobe PhotoShop & Premiere Elements Bundle Per License	$ 130.00			$ -			$ -
Adobe PhotoShop Elements Per License	$ 87.00			$ -			$ -
Adobe Premiere Elements Per License	$ 87.00			$ -			$ -
Miscellaneous 1	$ -			$ -			$ -
Miscellaneous 2	$ -			$ -			$ -
Miscellaneous 3	$ -			$ -			$ -
			[redacted]	$ [redacted]		[redacted]	$ [redacted]