A STUDY OF THE APPLICATION OF EMERGING TECHNOLOGY:
TEACHER AND STUDENT PERCEPTIONS OF THE IMPACT OF
ONE-TO-ONE LAPTOP COMPUTER ACCESS

A Dissertation by

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A STUDY OF THE APPLICATION OF EMERGING TECHNOLOGY: TEACHER AND STUDENT PERCEPTIONS OF THE IMPACT OF ONE-TO-ONE LAPTOP COMPUTER ACCESS

I have examined the final copy of this dissertation for form and content, and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education with a major in Educational Leadership.

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DEDICATION

To my husband, Doug, and our two children, Abby and Andy, for their love, unconditional support and unwavering encouragement throughout my educational journey.
Let’s have a little competition at school and get ready for the future.  
I will use a laptop and you will use paper and pencil. Are you ready…?

I will access up-to-date information—you have a textbook that is 5 years old.  
I will immediately know when I misspell a word—you have to wait until it’s graded.  
I will learn how to care for technology by using it—you will read about it.  
I will see math problems in 3D—you will do the odd problems.  
I will create artwork and poetry and share it with the world—you will share yours with the class.  
I will have 24/7 access—you have the entire class period.  
I will access the most dynamic information—yours will be printed and photocopied.  
I will communicate with leaders and experts using email—you will wait for Friday’s speaker.  
I will select my learning style—you will use the teacher’s favorite learning style.  
I will collaborate with my peers from around the world—you will collaborate with peers in your classroom.  
I will take my learning as far as I want—you must wait for the rest of the class.  
The cost of a laptop per year?—$250  
The cost of teacher and student training?—Expensive  
The cost of well-educated US citizens and workforce?—Priceless

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not about the number of years in your life, but rather the life in your years.
ABSTRACT

The purpose of this study was to describe and identify Sedgwick High School’s teacher and student perceptions of the impact of one-to-one laptop computer access using an appreciative inquiry theoretical research perspective and the theoretical frameworks of change and paradigm shift. An appreciative inquiry theoretical research perspective was used to structure a qualitative, embedded descriptive case study design. An embedded case study design was used to describe the perceptions of high school teachers and their students who were involved in a one-to-one laptop computer wireless environment on student learning and how teachers teach. Data were collected through teacher and student focus groups, as well as administration of the Left-Hand-Right-Hand Column Case Method. Data were analyzed using the comparative analysis matrix method (Miles & Huberman, 1994).

The analyzed data revealed six salient findings: (1) Students functioned in the capacity of teacher, (2) technology changed the way teachers and students communicated, (3) the culture of the classroom dynamics between teacher and student changed, (4) technology made learning enjoyable for students, (5) teachers and students believed immersion in a technology-rich learning environment created advantages for student success after high school graduation, and (6) teachers believed that access to ubiquitous technology created new challenges for maintaining student engagement in the learning process.

Five of the six findings suggested that technology had changed teaching and learning, and helped to create a paradigm shift in the teacher and student roles. Additionally, those findings also identified the positive core of Sedgwick High School,
serving to describe the life giving forces within the organization. One of the six findings revealed challenges associated with the application of emerging technology in the classroom.

The findings from this study have the potential to contribute to areas of study that focus on the use of technology in schools. Moreover, research from this study has the potential to help serve as a foundation for other school leaders who are seeking opportunities that prepare students for life in the technology-rich 21st Century through one-to-one laptop computer access.
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CHAPTER 1

Introduction

The exponential expansion of uses for new technologies being developed is revolutionizing how people learn, work, and communicate (U.S. Department of Commerce Technology Administration, 2002). Specifically, emerging technologies are empowering educators to address stringent academic standards, assessment, and accountability efforts (North Central Regional Educational Laboratory, 2003). Public attention has increasingly focused on the student’s academic achievement and the technology skills that they need to learn, work, and communicate in the technology-rich 21st Century. The No Child Left Behind Act (NCLB) (2002) requires that all 8th-grade students in the United States be technology literate by 2012. In this rapidly changing educational context, educators feel the increasing need to bridge the chasm between the knowledge and skills learned by many students in the traditional school setting and the skills and knowledge necessary to be successful in the technology-rich 21st Century workplace (Partnership for 21st Century Skills, 2003).

Students living in the technology-rich 21st Century currently have access to technology not experienced in previous generations. Researchers cite access to cell phones, pagers, digital equipment, handheld computers, laptop computers, email, instant messaging, and the Internet as contemporary components of what they refer to as the Digital Age (North Central Regional Educational Laboratory, 2003). As a result, living and working in the Digital Age requires a new kind of literacy that is beyond traditional reading, writing, and mathematical skills. Digital Age literacy may require a change in
the governing values that underlie pedagogy and student learning (Partnership for 21st Century Skills, 2003).

Historically, introduction of the use of technology into the classroom places the teacher in a quandary—one that encourages the need for pedagogical restructuring and change, and another that impedes the change process itself (Ringstaff & Kelley, 2002). Student learning in the Digital Age requires educators who can offer innovative pedagogical practices and positive student-learning environments that allow for a transformation in teaching and student learning (Reeves, 1998).

*Digital Age Workforce*

Transforming traditional classroom learning for the 21st Century is essential for preparing the Digital Age workforce to compete in a global society. The United States Bureau of Labor Statistics suggests that the top 10 occupations of the 21st Century will require workers who possess computer-related skills. Additionally, computer-related professions will grow at a rate of 25%, second only to health-care occupations by 2012. An increasing number of professions will experience a marked decline in job availability due to the proliferation of technology automation and an increase in office technology that reduces the need for office workers (U.S. Department of Labor, 2004). In effect, the global society, in general, and teachers and students more specifically are in the midst of a paradigm shift of learning *from* technology to learning *with* technology (Reeves, 1998). In 2002, United States Secretary of Labor, Elaine L. Chao emphasized the need to prepare a 21st Century workforce to have the ability to successfully adapt to transformations in the economy, globalization of the job market, and success in balancing personal and professional lives (U.S. Bureau of Labor Statistics, 2002). This paradigm
shift affects the work force in the Digital Age; it is transforming the way teachers teach and the way students learn.

Teaching and Learning in the Digital Age

When students learn from technology, the computer serves as a tutor, providing opportunities for drill, practice, and instructional delivery. Learning with technology offers students opportunities to use technology as a tool, a way of navigating the learning process, and enabling them to improve higher-level critical-thinking skills, and creativity, and to construct new knowledge. Technology is a vehicle for instructional delivery that has the potential to impact the teaching and learning environment (Reeves, 1998; Ringstaff & Kelley, 2002). Successfully negotiating the practice of learning from technology to learning with technology has generated a call for educational reform resulting in a paradigm shift.

This paradigm shift is a result of the discrepancy between what is learned in traditional classrooms and what is needed to live, work, and communicate in the Digital Age. Contemporary proponents of educational reform view the current educational structures within the United States as inadequate to satisfy global changes in work, the economy, and the personal lives of students (Schuyler & Gwyer, 1997). Some proponents of educational reform view the use of emerging technology in education as a vehicle for creating a new educational paradigm—one that restructures instructional practices, student outcomes, and the traditional curriculum (Means & Olson, 1995). Educators who embrace emerging technologies and the accompanying uncertainty may be better equipped at meeting the challenge of preparing students for the technology-rich 21st Century.
Background of the Study

In this section, I review the broad historical perspective of emerging technologies in schools by examining the legacy of technology use in education in the United States from five perspectives: (1) a historical perspective of emerging technologies in schools; (2) the Digital Divide and access via the Internet; (3) the evolution of technology legislation and mandated regulations; (4) the paradigm shift in the use of emerging technologies; and (5), how technology is reshaping the student learning environment.

Historical Perspective of Emerging Technologies in Schools

Historically, the computer age has been relatively short, spanning nearly 60 years (Molnar, 1997). In 1944, Harvard University became the first educational institution to effectively employ an operational computer (Bresnahan & Malerba, 1997). With funding from IBM, scientists at Harvard University created computer prototypes and large working computers. Computers were initially used in the domains of mathematics, science, and engineering as complex problem-solving tools, offering students a more efficient replacement for the slide rule. The emergence of computer-based education evolved in the late 1950s when Bitzer originated the PLATO system, the first large-scale use of computers in education. PLATO was a multi-thousand terminal computer system used by schools in Chicago, Illinois, a community college, and also an elementary school (Molnar, 1997; VanMeer, 2003).

During the 1950s, universities increased collaboration efforts in developing technologies used by the United States government and university partnership research projects (Bresnahan & Malerba, 1997). University students relied on the computer for complex problem-solving opportunities, solving authentic problems with embedded
multiple intricacies likely to be experienced in the real world. Following the introduction of PLATO, in 1963, Kemeny and Kurtz reconstructed how computers were being used, moving from a research tool to an academic resource by creating a new language code for computer programming called Beginner’s All-Purpose Symbolic Instruction Code (BASIC) (Technology Review, 2001). BASIC offered a new, easy-to-use language for programmers to write computer software, opening a new frontier for computer-based educational software to serve students in all grade levels (Molnar, 1997).

During the early 1970s, Seymour Papert from the Massachusetts Institute of Technology (MIT) developed a programming language called LOGO that was designed for use by children to improve higher-level critical thinking by simplifying tasks, thus altering educational applications of computers (Chakraborty, Graebner, & Stocky 1999). LOGO created microworlds where students could learn how to be problem solvers—not to solve problems, and how to be mathematicians—not to do mathematics (Molnar, 1997). Papert’s belief that students should have control over their learning quickly became the primary focus of a nationwide elementary school computer literacy campaign (Harel & Papert, 1990).

As Papert’s research continued, he expanded LOGO to interface with LEGO toy component kits. He believed that students learned more effectively when they constructed their knowledge from their learning (Papert, 1988). Papert’s approach to learning became known as “constructionism,” a term he explained as “learning-by-making.” Papert’s research began the transition from using computers in education to reinforce learning to the application of computers to solve real-world problems (Harel & Papert, 1990; Papert & Harel, 1991).
Shift to Personal Computers

In the early 1980s, the personal computer, a stand-alone device, was introduced (Bresnahan & Malerba, 1997), and computer-based tutorials and educational games were created by third party software developers for use in classrooms (Murdock, 1996). The decade of the microcomputer shifted the access from large mainframes to personal desktop computers (Stallard & Cocker, 2001). Additionally, the paradigm shift from an Industrial Age Society to an Information Society began to take place within the United States. Manufacturing and raw materials were no longer driving society or economics; access to information was the dominate economic driving force and growing at an exponential rate (Molnar, 1997; Resnick, 2002).

During the 1990s, computers of various sizes were introduced, and computer networks within business and industry were common (Bresnahan & Malerba, 1997). Networking protocols and simplified computer interfaces made networking easier within business, industry, and schools (Stallard & Cocker, 2001). During the 1996 United States presidential campaign, the influence of information access, specifically the World Wide Web (WWW), was of major interest at the national level, since candidates placed increasing emphasis on connecting schools and narrowing the Digital Divide (Kerr, 2004). The gap between the students who have access to technology and those who do not is often referred to as the Digital Divide. The Digital Divide represents disparities financially and in educational and social programs (North Central Regional Educational Laboratory, 2003).

By 2000, 377 million people world wide were using the WWW, exponentially forcing change in all facets of society, from changes that made the world smaller and
more connected to changes that negatively impacted society (Web-Based Education Commission, 2000). The WWW is a system of protocols that permits access to information sites on computer terminals all over the world, using a standard interface for information organization and search display. The WWW expedites the retrieval of data in various forms, including text, audio, and multimedia (U.S. Department of Education; National Center for Educational Statistics, 2002b).

*The Digital Divide and Access via the Internet*

The single factor that impacted the proliferation of access to information from the WWW and the utility of technology was the Internet (The Urban Institute, 2000). The Internet is a network of interconnected, world wide computers that allows for the exchange of information, ideas, and communication (U.S. Department of Education; National Center for Educational Statistics, 2002b). During the late 1990s, Internet access to technology and resources of the WWW became important educational tools (Stallard & Cocker, 2001). Internet access to technology and the WWW were quickly targeted as tools for school reform by politicians who viewed the Internet as a resource to help close the student achievement gap. Consequently, lawmakers sought to narrow the gap between students who had access to technology and those who did not, offering legislation targeted at closing the Digital Divide by increasing technology access in classrooms in the U.S. (Tinker, 2000).

The Digital Divide was produced by disparities in access for students to technology and resources of the WWW. It created an academic disadvantage for students who did not have access to the same resources (The Urban Institute, 2000). The Digital Divide is most apparent among students from economically disadvantaged backgrounds.
and/or who attend schools with limited technology resources (Florida Laptop Learning Task Force, 2004). It is important to close the Digital Divide and provide electronic access to information through resources available on the Internet to prepare students to live and work in the technology-rich 21st Century (Stallard & Cocker, 2001).

**The Evolution of Technology Legislation and Mandated Regulations**

This section offers a chronology of United States legislative reform efforts aimed at guiding the use of technology in school. This chronology is presented to emphasize the shift from what first began as funding for technology to an emphasis on legislation that dictated what technologies can and cannot occur within the classroom. There has been a shift in the focus of technology legislation and regulations at the federal level from monetary support garnered in 1963 to mandates with legislation in the late 1990s. The evolution of technology legislation and mandated regulations began with the Vocational Education Act of 1963 (Vocational Education Act of 1963, 1963), continued with legislation from the 1970s and 1980s, and is currently embedded in the No Child Left Behind Act of 2001.

President Kennedy signed the Vocational Education Act of 1963 (Vocational Education Act of 1963, 1963) into law, part of Public Law 88-210 that earmarked new funding for the use of technology in schools (Murdock, 1996). During the 1960s, new federal money was targeted to increase technology in schools, as well as for projects funded by the United States Department of Education, including mainframe computer demonstration projects (Withrow, 2001). Additional funding for technology during the mid-1960s came with the passage of the Elementary and Secondary Education Act of

During the 1970s, legislative action included the Career Education Incentive Act of 1977 (Career Education Incentive Act of 1977, 1977), part of Public Law 95-207, authorizing the creation of career education programs for students in elementary and high school (U.S. Department of Education; National Center for Educational Statistics, 2002a). The release of the 1983 federal report, “A Nation at Risk,” submitted by the National Commission on Excellence in Education (NCEE), headed by then Secretary of Education, T. H. Bell, brought to the forefront for the American people an urgency to focus on the need for educational reform (National Commission on Excellence in Education, 1983). The NCEE’s “A Nation at Risk” identified the importance of ensuring that every high school student be required to complete, at the minimum, one course in computer technology as part of the high school graduation requirement. Additional reform efforts included increased funding for vocational programs.

designed to serve as a warehouse for current research and best practices for science, math, and engineering education programs.

The High-Performance Computing Act of 1991 (High-Performance Act of 1991, 1991), part of Public Law 102-194, required the President of the United States to create a National High-Performance Computing Program. This program created a National Research and Education network. The law established standards and guidelines for such networks and identified the responsibility for maintenance of the networks with specific federal departments and agencies (U.S. Department of Education; National Center for Educational Statistics, 2002a).

The School-to-Work Opportunities Act of 1994 (Public Law 103-239) created an infrastructure within states and their communities for systems to prepare young people for their initial step into the job market or to continue their education (U.S. Department of Education; National Center for Educational Statistics, 2002a). Public Law 103-239 was designed to create a system of experiences for young people that connected what they were learning in school with what they could expect to encounter after completion of their education. Improving America’s Schools Act (Public Law 103-382) was signed into law in 1994 and re-commissioned the Elementary and Secondary Act of 1965, extending the regulations first identified almost 30 years prior, as well as including a component for professional development for teachers. President Bill Clinton signed the Telecommunications Act of 1996 (Telecommunications Act of 1996, 1996), based on the Communications Act of 1934 (Communications Act of 1934, 1934) that established “universal access” to contemporary forms of telecommunication. The Telecommunications Act, also known as E-rate, established the Universal Services Fund
and provided monetary support for schools, libraries, and hospitals for access to advanced telecommunication service including the Internet and telephone service (Kleiman, 1998).

The focus on funding for technology infrastructure and access changed with the passing of the Telecommunications Act of 1996. A paradigm shift began to occur as federal legislation moved from providing access to technology and telecommunications in schools to increasing the control of technology and telecommunications funding in schools based on controversial mandates. The controversial mandates included specific regulations to influence what schools could or could not do with the technology. The Consolidated Appropriations Act 2001 (Consolidated Appropriations Act, 2001, 2001), part of Public Law 106-554, amended the Elementary and Secondary Act of 1965 (Elementary and Secondary Education Act of 1965, 1965) to include the enactment of the “Children’s Internet Protection Act,” (CIPA); it serves as a safeguard requiring libraries and schools receiving federal funds to filter content retrieved from the Internet (U.S. Department of Education; National Center for Educational Statistics). Schools and libraries not complying with the federal mandate would be ineligible for discounted funding through E-rate for Internet access, some computer networking expenses, and telephone service.

The No Child Left Behind Act (NCLB) of 2001 (No Child Left Behind Act of 2001, 2002), part of Public Law 107-110, reauthorized the Elementary and Secondary Education Act of 1965 (Elementary and Secondary Education Act of 1965, 1965) and included additional language targeted at testing and accountability, including a component to require all 8th-grade students to be “technology literate” by the year 2012. Lawmakers and educators struggle to define technology literacy since they have
difficulty understanding and articulating the context of technology literacy (Finn, 2004). Federal technology legislation, mandates, and compliance have helped influence how technology is used in school.

*Paradigm Shift in the Use of Emerging Technologies in Education in the United States*

The proliferation of technology, including desktop and laptop computers as well as Internet access in classrooms throughout the United States, has led to a paradigm shift in the use of emerging technologies in schools. Technology in schools implies multiple definitions relative to the context or the era (U.S. Department of Commerce Technology Administration, 2002). For purposes of this study, technology in schools refers to the inclusion of computers and related equipment, the hard-wired and wireless infrastructure necessary to operate the equipment, and any and all equipment directly used in conjunction with computers in schools (U.S. Department of Education; National Center for Educational Statistics, 2002b).

As it became easier for educators to gain access to technology, the number of computers available to students in United States school increased. In 1995, there were 5.8 million instructional-use computers in United States schools, with a nationwide ratio of one computer for nine K-12 school students. Moreover, 75% of public schools in the United States in 1995 (U.S. Congress Office of Technology Assessment, 1995) had access to a computer network, and 3% had access to the Internet. In 2002, 92% of schools had Internet access in either classrooms or technology instruction laboratories accessible to students, with a student to computer ratio of 4.8 students to one computer (DeBell & Chapman, 2003).
In 2003, 32% of the schools with Internet access had a wireless network in place. In that same year, 8% of public schools in the United States loaned laptops to their students. Of the 92% of the schools not loaning computers, 6% planned to loan laptops to their students beginning with the 2004-2005 school year (Parsad & Jones, 2005). Increased technological access for students has produced a positive by-product through increased productivity, timely decision making, and communication for teachers and administrators as well as students (Consortium for School Networking, 2004).

**Integration of Technology into Pedagogy**

The following section offers an overview of what occurs with the integration of technology into pedagogy. Additionally, this section explains how the introduction of technology into pedagogy affects change in the teaching environment.

As schools increase the access to technology, specifically computers and the Internet, educators also continue to grapple with the challenges and benefits of technology to their pedagogical practices (Rockman, 2003). Technology can affect pedagogical strategies by facilitating the transition from a teacher-centered learning environment to a student-centered learning environment (Tsang-Kosma, 1999; U.S. Congress Office of Technology Assessment, 1995).

A three-year study on the impact of laptop computers in classrooms revealed teachers moved from a lecture-style instructional delivery model to a more student self-directed teaching model (The George Lucas Educational Foundation, 2002). Student-centered classrooms allow for the use of technology that impacts the collaborative learning process, encourage the sharing of information, increase the emphasis on critical thinking, and allow students to choose how they demonstrate their understanding of the
concepts presented (Tsang-Kosma, 1999). Additionally, technology integration can help teachers overcome isolation by allowing students to interact instantaneously with experts in the field (U.S. Department of Commerce Technology Administration, 2002).

The introduction of technology into the teaching process can help organize and provide structure for the teacher’s instructional materials, as well as allow for improved communication between teachers and students, and teachers and parents (U.S. Department of Commerce Technology Administration, 2002). Additionally, technology integration into classroom instruction impacts instructional practice by supporting educational goals and improving the teacher-student relationship (U.S. Department of Education; National Center for Educational Statistics, 2002b).

How Technology is Reshaping the Student Learning Environment

The following section explains how technology is reshaping the student learning environment by restructuring teacher instructional practices, individualizing and customizing student instruction, and increasing the opportunities for project-based learning activities in the classroom (Means & Olson, 1995). The introduction of technology into the classroom can increase opportunities for teaming and collaboration (North Central Regional Educational Laboratory, 2003). Role reversal between the teacher and student is also common where technology integration is present within the classroom (Davies, 2004).

Technology not only impacts how teachers teach, but also how students learn (U.S. Congress Office of Technology Assessment, 1995). The National Educational Technology Standards for Students (NETS) Project, under the direction of the International Society for Technology in Education (ISTE) in partnership with the U.S.
Department of Education and more than 20 educational organizations, authored national student technology standards in an effort to identify technology standards for students in primary and secondary schools (International Society for Technology in Education, 2000).

Prior to the NETS Project, national technology standards for students did not exist. The NETS Project addressed the following areas: (1) basic computer skills, (2) ethical and social issues related to technology use, (3) using technology for productivity, (4) using technology for communication, (5) using technology for research, and (6) using technology for problem solving and decision-making. The NETS Project provides teachers with benchmarks for effective technology integration.

Effective technology integration impacts student learning by increasing the opportunities for high-order critical thinking and analysis, and synthesis of material in the classroom (Lowther & Ross, 2003). Technology integration allows greater student participation in learning decisions. In effect, greater student participation, also known as engaged learning, allows students to select the technology tools they need to successfully gather the material or information required without aid from the teacher. Self-directed learning that involves technology provides students opportunities to synthesize and analyze data, and also affords them an opportunity to present the data using multimedia (U.S. Department of Education; National Center for Educational Statistics, 2002b).

Benefits to Students

The integration of effective technology integration is beneficial to students (Apple Computer Inc., 2003). Students who have access to laptop computers work more independently, spend more time on academic endeavors, and pay increased attention to
corrections and editing their work (Davies, 2004). Students are also more actively engaged in their learning, assume challenging tasks, and are motivated to learn (Kerr, Pane, & Barney, 2003). Providing a laptop computer to students during the school day creates equal access to resources and offers students tools for electronic global communication (Gravelle, 2003). Students in technology-rich learning environments express a higher self-efficacy (Rockman, 2003).

Statement of the Problem

Teachers in the United States are in the midst of a paradigm shift that is affecting the teacher-teaching environment and the student-learning environment. As teachers struggle with traditional pedagogy, instructional practices, and disparities in student academic achievement, they face increasing criticism and pressure to promote an emphasis on preparing their students for the technology-rich 21st Century. They also face challenges associated with using technology; for example, they may not know how to manipulate or access data (Stallard & Cocker, 2001). Additionally, they face the challenge of readiness for emerging technology. Possessing openness to emerging technologies is critical for teachers in the technology-rich 21st Century as technology continues to accelerate at a rapid rate.

Readiness for new technologies is a challenge associated with change. Teachers who resist change may impede and/or limit their students’ learning and skills. Teachers, therefore, must prepare students by teaching knowledge and skills necessary for students to be successful in the technology-rich 21st Century.

A chasm exists between the knowledge and skills that most students gain from school, and the knowledge and skills they need to live and work successfully in the 21st
Effective integration of technology affects student learning and allows greater student participation in learning decisions. Consequently, it is important to understand why some teachers are open to emerging technologies and embrace the uncertainty that accompanies change.

This study proposes to employ an appreciative inquiry theoretical research perspective to describe the results of emerging technologies, based on teacher and student perceptions of the teaching and learning environments because of their involvement in a technology-rich school environment where students have access to wireless laptop computers. The study addresses the following overarching question: How does the application of readily accessible emerging technologies in classrooms affect teaching and learning?

Purpose of the Study

The purpose of the study was to describe and identify, through an appreciative inquiry theoretical research perspective, teacher and student perceptions of the impact of one-to-one laptop computer access. The perceptions of the impact of one-to-one laptop computer access on Sedgwick High School teachers and students was studied through the theoretical frameworks of change (Schein, 1995), paradigm shift (Kuhn, 1962, 1996), and an appreciative inquiry theoretical research perspective (Cooperrider & Srivastva, 1987).

Overview of Methodology

A qualitative, embedded, descriptive case study design was used to understand teacher and student perceptions of the impact of one-to-one laptop computer access. An embedded case study design allowed for the study of multiple units of analysis (Yin, 1984). In this study, teachers and students were the units of analysis.
Appreciative inquiry is a theoretical research perspective that focuses on the optimistic nature of an organization and strives to reveal its “positive core” by focusing on “what works” in the organization. Additionally, appreciative inquiry theoretical research perspective reveals the positive core within an organization by revealing the “life-giving forces” inherent within the organization. Life-giving forces include the unique attributes of the context and setting that give life to the organization, and are coupled with the possibilities that may arise with effective organizing and the resulting relationships (Cooperrider, Whitney, & Stavros, 2003). Appreciative inquiry may best be understood through the following illustration of a rite used by the Babemba tribe of South Africa:

In the Babemba tribe of South Africa, when a person acts irresponsibly or unjustly, he is placed in the center of the village, alone and unfettered. All work ceases, and every man, woman and child in the village gathers in a large circle around the accused. Then each person in the tribe, regardless of age, begins to talk out loud to the accused, one at a time, about all the good things he has done in his lifetime. Every incident that can be recalled with any detail and accuracy is recounted. All his positive attributes, good deeds, strengths and kindness are recited carefully and at length. The tribal ceremony does not cease until everyone is drained of every positive comment s/he can muster about the person in question. At the end, the tribal circle is broken, a joyous celebration takes place, and the person symbolically and literally is welcomed back into the tribe. (Thatchenkery, 1999, ¶ 1)
An appreciative inquiry theoretical research perspective permits participants to describe how the organization has been successful and encourages dialogue among participants to describe their hope for the organization, its members, and its stakeholders. Using an appreciative inquiry theoretical research perspective purposefully conveys the notion that the study is framed in a positive manner. Focusing on teacher and student perceptions of the positive impact of one-to-one laptop computer access, allows the teachers and students to share what is working and to review statements that describe where the organization (Sedgwick High School) wants to be, based on the successes of its past (Hammond, 1998). Appreciative inquiry theoretical research perspective focuses on the possible (Cooperrider et al., 2003). Data for this study was collected at Sedgwick High School in Sedgwick, Kansas.

Research Questions

Four research questions guided this study:

1. How do teachers in a technology-rich high school environment describe the impact of one-to-one laptop computer access?
2. How do teachers in a technology-rich high school environment describe the impact of one-to-one laptop computer access on student-learning?
3. How do students in a technology-rich high school environment describe the impact of one-to-one laptop computer access?
4. How do students in a technology-rich high school environment describe the impact of one-to-one laptop computer access on how their teachers teach?
Objectives

Through the answers identified in the research questions, the following research outcomes were achieved:

1. The identification of how teachers in a technology-rich high school environment described the teaching environment.

2. The identification of the aspirations of teachers in a technology-rich high school environment for student learning.

3. The identification of how students in a technology-rich high school environment described the impact of one-to-one laptop computer access.

4. The identification of the aspirations of students in a technology-rich high school environment for their learning.

Significance of the Study

Findings from this study have the potential to contribute to areas of study that focus on the use of technology in schools. Studies on the impact of a technology in schools offer insight into the change process within the teacher-teaching environment (Davies, 2004; Fisher, Dwyer, & Yocam, 1996). Additional studies have focused on the impact of laptop computers in the student-learning environment (Kerr et al., 2003; Lowther & Ross, 2003). While the debate as to whether or not educators should embrace emerging technologies is often contested, research on teacher and student perceptions of the impact of one-to-one laptop computer access and their ability to embrace the uncertainty that accompanies change has yet to be seriously explored.

Findings from this research will offer educators new insights into integrating emerging technologies into their schools or pedagogical practices. Additionally, this
study will provide educators with research to guide their decisions when deciding to provide a wireless laptop computer for every student in a technology-rich one-to-one learning environment. The research will also contribute to the body of knowledge surrounding technology-rich learning schools that offer a wireless laptop computer for each student and other technologies as they may emerge, as well as aid educators who seek to create a climate of change to prepare teachers and students to embrace new emerging technologies in their classrooms.

Delimitations and Limitations

This study has the following delimitations:

1. It is delimited to students in grades 10, 11, and 12 at Sedgwick High School, USD 439, Sedgwick, Kansas.
2. It is delimited to teachers at Sedgwick High School, USD 439, Sedgwick, Kansas, who teach students in grades 10, 11, and 12.

This study has the following limitations:

1. It is limited by the use of the appreciative inquiry theoretical research perspective, in that appreciative inquiry seeks to describe and identify what is good about an organization and focuses on the dreams of the individuals.
2. It is limited by the researcher’s employment as a district administrator for USD 439 who is responsible for technology and curriculum, spanning kindergarten through twelfth grade.

Assumptions

This study assumes the following:
1. Sedgwick High School has teachers who have embraced emerging technologies into their classroom instruction.

2. Providing a wireless laptop computer for students has had an impact on student learning at Sedgwick High School.

3. Teachers are able to identify the difference in the student-learning environment in a technology-rich environment.

4. Teachers are able to identify the difference in the teacher-teaching environment in a technology-rich environment.

Definition of Key Terms

*Appreciative Inquiry*

Appreciative inquiry is a collaborative process that seeks the best in people, their group or organization, and their world (Cooperrider et al., 2003). It requires an orderly investigation into the “life-giving” forces of the organization. This study used appreciative inquiry as a theoretical research perspective to identify and discover the positive core embraced by teachers and students for the use of emerging technologies in a technology-rich learning environment where students have access to one-to-one laptop computers.

*Digital Age*

The Digital Age refers to the impact of technology on every aspect of human life - from the influence of technology on the workplace to the flow of goods and information globally, to the influence of technology on daily life (Partnership for 21st Century Skills, 2003). The Digital Age permits computer-based tools to complete the tasks of everyday life (Trilling & Hood, 1999) and places particular emphasis on the impact of the
expanding interaction among members of the global society (Partnership for 21st Century Skills).

Laptop Computer

A laptop computer is a portable computer that can run on a rechargeable battery, usually weighs less than eight pounds, and is able to fit on a person’s lap (U.S. Department of Education; National Center for Educational Statistics, 2002b).

One-to-One Laptop Initiative

A learning environment where students and teachers have access to a wireless laptop computer at school and at home (Pitler, Flynn, & Gaddy 2004).

Paradigm Shift

A paradigm shift represents a change in the commonly held belief about a specific concept or idea. A paradigm shift occurs over time, transforming and morphing in a series of reiterations as a result of change (Kuhn, 1996).

Technology Integration

Technology integration allows students to choose the most effective technology tool and then successfully harvest the information needed to effectively and efficiently synthesize and analyze the data and then to present it using multimedia (U.S. Department of Education; National Center for Educational Statistics, 2002b).

Technology-rich

Technology-rich is the pervasiveness of many different types of technology and electronic communication within an organization, business, or school in addition to computers, hardware, and software.
Wireless

A computer wireless network system that connects two or more pieces of equipment; computers, and peripheral devices that access the computer network without aid of a wire or cable (U.S. Department of Education; National Center for Educational Statistics, 2002b)

Chapter Summary

Chapter 1 outlined the background of this study, statement of the problem, purpose of the study, research questions, objectives, significance of the study, delimitations and limitations, assumptions, and definition of terms. Chapter 2 provides a literature review, overview of the conceptual framework, epistemology, theoretical frameworks, competing perspective, methodology for the search of the empirical research, and a synthesis of the relevant empirical research.
CHAPTER 2

Review of the Literature

Chapter 2 is comprised of the conceptual framework, epistemology, descriptions of the theoretical frameworks, competing perspective, methodology for inclusion in the review of the empirical literature, and synthesis of the reviewed empirical literature as it relates to technology-rich learning environments, where each student has a laptop computer.

Overview of Conceptual Framework

The availability of technology in schools throughout the United States has steadily increased over the past decade (Rockman, 2003). This steady increase has caused a gap in the way teachers and students use technology (Becker, 2000). Students with access to emerging technology retrieve and organize information differently than students without similar access to technology. Student access to emerging technology has forced teachers to reconsider their traditional pedagogical strategies. Changing pedagogical strategies directed toward improving technology integration skills requires considerable effort and time aimed at training staff (Consortium for School Networking, 2004).

The hesitancy for teachers to embrace change creates an incongruence between how technology is used in school and how it is used by students in their day-to-day activities (Partnership for 21st Century Skills, 2003). Preparing students for life in the Digital Age requires teachers who can successfully teach both the use of technology in school and the technology skills and knowledge necessary for students to live, work, and communicate successfully in the technology-rich 21st Century. It is important that teachers prepare their students for the complex, authentic intellectual work that may be
part of a sustained and productive adulthood (Means, Blando, Olson, Middleton, Morroco, Remz, & Zorfass, 1993).

Authentic intellectual work requires the original application of knowledge through disciplined inquiry in a personally meaningful approach (Newmann, Bryk, & Nagaoka, 2001). When this is coupled with authentic pedagogy, the teacher assists the student to interpret, process, and apply new knowledge that fosters independent and critical high-level thinking (Newmann & Wehlage, 1995). When teachers structure learning in a way that allows students to make a connection between the classroom and their lives outside of school, students construct complex work more intellectually (Newmann et al., 2001).

Research suggests that teachers who structure authentic learning environments through the use of technology help provide learning opportunities for students to authentically learn (Rockman, 2003; The George Lucas Educational Foundation, 2002). Teachers in classrooms with pervasive access to technology, where each student has a laptop computer, were found to abandon teaching strategies that were ineffective; instead, they experimented with new pedagogical approaches and techniques. They eventually adopted many of these pedagogical strategies (Davies, 2004).

My experience working with teachers and students in a technology-rich learning environment helped me to frame the conceptual framework for this study. Infused in my experience is an epistemology of social construction and a theoretical framework comprised of organizational change (Schein, 1995) and the notion of paradigm shift (Kuhn, 1962, 1996). Moreover, I filtered my conceptual framework through an appreciative inquiry theoretical research perspective (Cooperrider et al., 2003), which
allowed me to focus on the “life-giving” forces of the technology-rich learning environment.

_Epistemology of Social Constructionism_

Social constructionism is the epistemology that serves as the basis for this research. Developing meaning in a social constructionist paradigm is a generative, collective process, relying on the interactions among those within the culture (Crotty, 1998). This co-construction of meaning is collective and generative (Nicolson, 2002). Social constructionism was chosen because of its strong connection to the study’s theoretical framework that included organizational change, paradigm shift, and an appreciative inquiry theoretical research perspective. Social constructionism allowed the emphasis to be placed on sense-making, as generated by the interactions among teachers and students, leading to an evolution in greater meaning and understanding. Social constructionism is the epistemological foundation for appreciative inquiry, the theoretical research perspective for this study. Like social constructionism, appreciative inquiry is a recursive process that relies on the collectively generated social construction of sense-making among people. Sense-making and making meaning are derived from the interaction of the individuals involved in the process and are inherent in the appreciative inquiry theoretical research perspective (Cooperrider & Srivastva, 1987).

Since this study began with specific assumptions about the impact of technology on student learning at USD 439, each assumption was grounded in the belief that the introduction of technology has an impact on student learning. By viewing this study though a social constructionist epistemology and appreciative inquiry theoretical research perspective, it was theorized that the students and teachers in this technology-rich
environment would reveal the impact of access to one-to-one laptop computers on student learning.

The literature review for this study presents the theoretical framework and first examines the theoretical perspective of organizational change (Schein, 1995), filtered through the notion of paradigm shift (Kuhn, 1962, 1996), followed by an integration of an appreciative inquiry theoretical research perspective (Cooperrider & Srivastva, 1987). The literature review concludes with a discussion of relevant empirical research that examines emerging technologies in schools, specifically one-to-one laptop computer learning initiatives that influenced change within schools.

Organizational Change

The primary assumptions essential to change are derived from the work of Lewin (Schein, 1995), who proposed change as a series of freezing and refreezing behaviors. Lewin’s original work stemmed from a strong commitment to action research and interest in understanding organizational change and group evolution (Lewin, 1947). He suggested that to understand an organization, it was first necessary to try to change it.

Lewin (1952) described a “force field” analysis model to interpret organizational change as a way of understanding the change process. Force fields represent driving forces and restraining forces within the organization that operate in juxtaposition to maintain the organization’s equilibrium. Driving forces sustain change initiatives. Restraining forces counteract the driving forces in an attempt to maintain equilibrium in an organization. Change results when disequilibrium is maintained. Disequilibrium forces disruption in the normal routines of the organization’s members. Disequilibrium has many sources. One source is the disconfirmation of old beliefs and the substitution of
new beliefs. In this case, disconfirmation is a form of education that serves to unfreeze what was learned with disconfirming information, while education adds information that serves as the basis for new beliefs, attitudes, and actions (Schein, 1995).

Schein (1997) suggests that sufficient psychological safety encourages members to change. The evolution of change is directly linked to learning how to learn and doing it quickly; it may present risk for the participants. Schein refers to this process as Anxiety I and Anxiety II levels. Anxiety I occurs when an individual’s fear of learning is associated with change. Anxiety II occurs when the individual realizes his/her survival is at stake and is forced to make appropriate changes. Change occurs more freely among people and organizations when the fear of learning (Anxiety I) is reduced and becomes less than their fear of survival (Anxiety II) (Schein, 1995).

By nature, disequilibrium creates a challenge for humans, and there is a resistance to change. An illustration of reducing the fear of learning is analogous to telling a child it is dangerous to cross the street, but then, in turn, by teaching the child to first look both ways and then to proceed cautiously (Schein, 1995). When there is sufficient psychological safety, people freely learn. The increase in learning or the disconfirmation allows the unfreezing (Lewin, 1947) to happen faster, resulting in change.

Managing Anxiety I and Anxiety II behaviors results in “cognitive restructuring.” Cognitive restructuring emerges when the individual or group “thinks differently” about beliefs, values, and actions. “Thinking differently” creates the opportunity for the individual or group to internalize newly acquired beliefs, values, and actions. Reducing the fear that is associated with learning (Anxiety I) will support opportunities for relearning and promotes a non-linear approach to change (Schein, 1995).
Argyris and Schon (1978; 1996) built on the work of Lewin and complements Schein’s work to explain organizational learning, clarifying how members can be observed in the underlying preconceived ideas and actions of members to a given situation. These are called theories-of-action. Theories-of-action are comprised of espoused theories and theories-in-use. Espoused theories are beliefs and values that members publicly espouse but may not internalize. Theories-in-use are the observable actions and behaviors that members use to function in their day-to-day activities. Argyris (1999) categorizes two models for explaining organizational learning: Model I and Model II. Model I behavior impedes organizational learning and stymies the change process because it never questions underlying values. It produces defensive actions that generate an escalation in error in behaviors indicated by the prevalence for single-loop learning. Single-loop learning occurs when there is a change in behavior unaccompanied by a change in values or beliefs.

Conversely, Model II behavior results in values and norms that promote openness and sharing of unspoken assumptions and biases, and provides an environment that supports open dialogue of opposing views. Model II, using double-loop learning, identifies and questions underlying governing values. It serves as the foundation for effective organizational learning through tacit knowledge of shared principles and openness to inquiry. The type of learning in Model II is referred to as double-loop learning (Argyris & Schon, 1978). Organizational change occurs through double-loop learning and the ability to reveal the tacit held information, assumptions or shared beliefs among all members of the organization. Double-loop learning occurs when members of an organization gain new knowledge through a recursive relearning process where
governing values are identified and questioned (Argyris, 1992, 1999). Double-loop learning is non-linear and recursive. Systems thinking operates in a similar manner (Fowler, 2003).

Systems thinking is the ability to see things as interrelated and part of a whole, not separated or in isolation. Systems thinking is generative as well as congruent with double-loop learning and the recursive nature of the change in behavior as a result of the reflective relearning process (Senge & Fulmer, 1993). Senge (1994) identified a set of systems archetypes to explain organizational behavior: (1) balancing process with delay, (2) limits to growth, (3) shifting the burden, (4) eroding goals, (5) escalation, (6) tragedy of the commons, and (7) growth and under-investment. Each archetype represents common behaviors that explain the learning and relearning process and inherent impediments. One archetype that may explain how educational systems work is the limits-to-growth archetype that includes the growth loop and how it interacts with the balancing loop.

The growth loop creates a set of behaviors that impact more of the behaviors resulting in growth or decline. Change during a growth loop may initially remain unnoticed; it becomes noticed when it achieves a certain threshold and change is rapid (Senge, 1994). The balancing loop operates as a recursive cycle of balancing behaviors that strive to maintain homeostasis. A state of disequilibrium results when a gap occurs between the current state and the desired state. The gap drives the behaviors that are designed to move the current state in the direction of the desired state. The balance and counterbalance continues until homeostasis occurs. The rapid increase in change in society, in general, and in education, in particular, that is brought about by the influence
of technology on education may be at the same rate that a paradigm shift is occurring. Within a paradigm shift, new growth loops and balancing loops are continuously formed.

The speed of technology was first identified by Moore (1965) who observed that the number of transistors placed on integrated computer circuits doubled every year. The shrinking transistor size accounts for the doubling and allows for more chips on each circuit board. Moore’s observation, known as Moore’s Law, illustrates the exponential growth in computer chip technology and provides a way to explain the convergence of the growth of technology and the speed at which technology changes, citing more chips on the circuit board equals more processing power. Using Moore’s law, Kurzweil (2001) predicted that the 21st Century would bring 20,000 years of progress at the current rate.

The exponential expansion of the change process is further illustrated by the Law of the Photon (Gilder, 2000). Gilder theorized that as the power of technology doubles, as demonstrated by Moore’s Law, bandwidth speed triples annually, and every 18 months the quantity of bandwidth per dollar doubles. Implications of the Law of the Photon suggest that the consumer will be able to purchase more bandwidth speed for less over time. The Law of the Photon suggests the power to communicate doubles every six months; one month’s worth of information sent over the Internet in 1997 now takes one second over a single cable.

As the speed of technology increases, the growth loop that traditionally achieves balance no longer maintains homeostasis. Instead of achieving balance, the growth loop morphs into a new paradigm with its own growth and balancing loops. Educators, caught in this new paradigm with accelerating growth and balancing loops, are faced with learning to use new technology at a faster pace. A cycle evolves as new technologies
emerge, requiring more learning on the part of the teacher and less time for fully internalizing the newly acquired skills. New growth and balancing loops are created to accommodate the introduction of technology in the learning environment.

Paradigm Shift

A paradigm shift occurs when broad systemic change alters the belief system; the beliefs are filtered through multiple points of view held by numerous participants and result in a unique interpretation. The paradigm shift requires a readjustment in the thinking of the individuals involved in the discovery (Kuhn, 1962, 1996, 2000). The broad systemic change is a result of a transformation process. The transformation process occurs as the accepted reliable solutions to a puzzle are replaced by a revolutionary thought that challenges the commonly accepted world view.

Kuhn (1962; 1996) described the broad systemic change process associated with a paradigm shift as a “scientific revolution.” He theorized that no two scientists observing the same event or “revolution” will interpret the event in the same way; each interpretation is individually exclusive. As such, science experiences waves of normalcy and revolutions. Traditional science offers theories or assumptions grounded in the possibilities of what is to be expected or permitted from a cumulative selection of expected solutions. Conversely, scientific revolution creates a revision to the expected solutions, creating a paradigm shift or change that results from the anomaly.

Advances in technology are the catalyst for paradigm shifts in most disciplines, whether science, economics, government, or education. As paradigm shifts occur in multiple fields at every level, they both create and identify other problems (Barker, 1992). A paradigm shift is occurring in education in the United States as schools
transition from an industrial age to an information age model of instruction (Trilling & Hood, 1999). As education in the information age takes place outside the walls of the traditional brick and mortar school and learning becomes more digital, it moves from teacher-centered to student-centered (Davies, 2004).

Prior to the information age, students who did not complete high school could find employment that did not require high levels of reading or math; in the Digital Age the lack of a high school education increases the odds of a life associated with poverty and numerous other social problems (Florida Laptop Learning Task Force, 2004). Contemporary students in the United States are considered “Digital Natives;” they think and speak the language of computers, video games, technology, and the Internet (Prensky, 2001). They represent approximately 100 million students born between 1976 and 2000 who have grown up with the Internet and an understanding and reliance on digital technologies.

In much the same way as the Guttenberg Press liberated the common man during the Middle Ages, so does the use of the Internet and access to global information (Jukes & McCain, 2001). The Google statistics Web page provides the most popular queries globally submitted to the search engine (Google.com, 2005). Google uses Zeitgeist, a German word which means the “cultural climate of an era,” to reflect the most popular searches conducted and disaggregate the results by country. During the week of October 24, 2005, for example, the Google search engine reported “Hurricane Wilma” was the most popular search term in the United States, returning 24,700,000 “hits,” while in England for the same period, “Mayo Clinic Diet” was the most popular search, with 1,630,000 “hits.” The increasing worldwide popularity of the Internet, the growing
accessibility of information, and the speed at which it can be retrieved allows anyone with a connection to the Internet global access to databases, information, news, e-commerce, and a multitude of other resources (Horrigan & Rainie, 2002).

The speed of change coupled with the convergence of communication, technology, and information provide supple ground for paradigm shifts in all aspects of society, including education. To understand the challenges presented by emerging technologies in education, it is important to explore change and paradigm shifts to reveal the promising aspects they represent; an appreciative inquiry theoretical research perspective facilitates this process.

Appreciative Inquiry Theoretical Research Perspective

Appreciative inquiry theoretical research perspective focuses on the positive characteristics of an organization. As a theoretical research perspective, appreciative inquiry directs the line of inquiry toward “life-giving” or generative forces within the organization and its members (Cooperrider & Srivastva, 1987; Hammond, 1998). This line of inquiry contrasts with critical theory that has a problem-based focus. The life-giving forces of the group or organization are identified as its “positive core” and identify, establish, and emphasize the “life-giving” forces of the group or organization (Cooperrider et al., 2003).

Two assumptions drive the appreciative inquiry theoretical research perspective: the quest for knowledge, and a theory comprised of cooperative action that advances the good will of the organization. This process is achieved through intentional inquiry, where the intent of the inquiry is to help members rediscover the best of their past and to use it as the foundation for building the future. In appreciative inquiry, human knowledge and
organizational destiny are interlaced creating a symbiosis between how individuals perceive the organization and the organization’s destiny. The organization becomes what the membership envisions (Cooperrider & Srivastva, 1987; Cooperrider et al., 2003; Hammond, 1998).

Appreciative inquiry underlies the belief that the linguistics of an organization defines the reality of the organization. Words offer a symbolic, literal, and often emotional meaning for members of the organization. In the use of appreciative inquiry, changing words alters the focus from traditional problem-based to hope-based. The use of appreciative inquiry stimulates a generative process that evolves as those who experience it participate in the process. Appreciative inquiry offers participants a sense-making process where each participant makes a contribution to the process to affirm and describe what is positive about their organization (Cooperrider et al., 2003).

The application of an appreciative inquiry theoretical research perspective is critical for this study because it identifies the “life-giving forces” of an organization and yields powerful insight and information into the dynamics of the organization. If educators are to embrace the challenges of preparing students for life in the Digital Age, then it may be important to first identify what is working in schools and then build on that success.

Appreciative inquiry is beginning to emerge as a theoretical research perspective in research involving schools. Researchers have focused on reform-related issues as well as understanding teacher motives for working in an inner-city high school (Calabrese, Goodvin, & Niles, 2005; Ryan, Soven, Smither, Sullivan, & VanBuskirk, 1999). Other work in this area appears to be limited to dissertations and self-reporting. An appreciative
inquiry research perspective will build on successes that teachers and students experienced in a technology-rich teaching environment and reveal a greater understanding of how emerging technologies may influence teaching and learning in the future.

**Competing Perspective: Critical Theory**

Appreciative inquiry has as its origin as a response to the problem-based perspective of critical theory (Cooperrider & Srivastva, 1987). Critical theory was considered as a way to frame my study. Critical theory focuses on the way in which participants may be privileged at the expense of others (Bogdan & Biklen, 2003). It forces the researcher to look at the difference between subgroups, and how power is dispersed and held among groups to the advantage of some and the disadvantage of those less powerful (Patton, 2002). Critical theory scrutinizes the organization as a whole by segregating subsets to look for differences (Ludema, Cooperrider, & Barrett, 2001). Disparities exist within subset populations in schools, suggesting that economically and culturally dominant groups are more likely to successfully place blame for the errors in educational decisions on non-dominant subgroups (Apple, 1995).

This study does not use critical theory as a theoretical framework because of its stress on being problem-based. The validity of many of the arguments made by critical theorists in regards to schooling are acknowledged, however, in contrast, this study uses an appreciative inquiry theoretical research perspective because of the belief that human beings can alter their future by choosing their line of inquiry. The focus of appreciative inquiry is to resolve problems by building on an organization’s assets (See Calabrese, Goodvin, & Niles, 2005).
The following section explains the methods for selecting data relevant to this study, including the examination of emerging technologies in schools, specifically laptop computers, within the theoretical framework of change and filtering through the lens of paradigm shift, followed by the integration of an appreciative inquiry theoretical research perspective. The intertwining of these three theoretical perspectives served as the foundation for review of empirical research as it related to the theoretical framework.

Search Methodology

Search methods for the review of empirical literature were intended to discover, understand, summarize, and synthesize all pertinent studies that report a relationship between theories of change, paradigm shift, and appreciative inquiry theoretical research perspective with the high school teacher teaching environment that includes the ubiquitous presence of emerging technologies. A thorough database search was conducted using title and keywords. Additionally, all empirical research with an emphasis on appreciative inquiry relevant to the research topic was also reviewed using the Emerald Insight database.

Primary searches within title, author, and keyword were conducted using Google Scholar, ERIC FirstSearch, and Infotrac OneFile Plus. The results of those searches are presented in Table 2.1. The same keywords and pattern of searching were applied to all databases. Table 2.1 illustrates the search methods and keywords used in reviewing the literature, as well as the electronic databases used in the process.
Table 2.1

Internet Keyword Search Results

<table>
<thead>
<tr>
<th>Keywords</th>
<th>Google Scholar</th>
<th>ERIC FirstSearch</th>
<th>InfoTrac OneFile Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>organizational change</td>
<td>73,100</td>
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<td>7,515</td>
</tr>
<tr>
<td>organizational learning</td>
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<td>66</td>
<td>21</td>
</tr>
<tr>
<td>systems thinking</td>
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<td>4</td>
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<tr>
<td>paradigm shift</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>appreciative inquiry</td>
<td>5*</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Keywords</th>
<th>Google Scholar</th>
<th>ERIC FirstSearch</th>
<th>InfoTrac OneFile Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>high school</td>
<td>424,000</td>
<td>67,952</td>
<td>46,528</td>
</tr>
<tr>
<td>Laptop</td>
<td>4,900</td>
<td>26*</td>
<td>1*</td>
</tr>
<tr>
<td>Teaching</td>
<td>3,040</td>
<td>9*</td>
<td>6*</td>
</tr>
<tr>
<td>Learning</td>
<td>2,720</td>
<td>8*</td>
<td>3*</td>
</tr>
<tr>
<td>Kansas</td>
<td>341*</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*All literature from these results was reviewed.

The theoretical framework research for this study focused on using the key search terms associated with the concepts they represent. It began with the broadest term, then continued to narrow each subsequent search beginning with organizational change,
followed by organizational learning, systems thinking, paradigm shift, and appreciative inquiry.

The search term “organizational change” offered a broad stage to explore the facets associated with change in a group or organization. The initial Google Scholar results returned 73,100 “hits” for “organizational change.” Change in the school organization is difficult and may be impacted by changing teacher and principal norms that focus on the why, what, and how of change (Keedy & Achilles, 1997). Regardless of the size of the school, organizational change is impacted by an increase in the global influences of technology, economics, and society (Calabrese, 2002). Most organizational change involves behavior change (Schein, 1995). Beginning with “organizational change,” I laid the foundation for understanding change within the school organization.

The second search term “organizational learning” was chosen because of the parallel that exists between the relationship of change and learning. Adding “organizational learning” to “organizational change” resulted in 5,390 “hits” from Google Scholar. School change and organizational learning occur in schools with conditions that advocate the open exchange of learning among teachers. Initial research suggests that factors supporting teacher motivation to share their learning are closely tied to reduction of restraining factors, not factors that increase teacher motivation (Collinson & Cook, 2004). School reform efforts are closely tied to the consistent sharing of ideas and ongoing dialogue among large and small groups of faculty members (Kruse, 2001). The sharing of ideas and ongoing dialogues are recursive, fundamental to the change process, and consistent with double-loop learning.
A strong correlation exists between organizational learning and double-loop learning and reflection, allowing for recursive understanding of change (Argyris, 1999). Organizational learning may help to change the focus from immediate goals to consideration of future possibilities (Senge & Lannon, 1990).

The third search term, “systems thinking” offered additional insight into the many facets of change and their interconnectedness, as well as providing a lens through which to view the change process. The addition of “systems thinking” to “organizational change” and “organizational learning” narrowed the search results to 626 from Google Scholar. For change to occur, educators must identify themselves as part of the whole, not isolated and disconnected from a larger system (Hargreaves & Fink, 2003).

“Paradigm shift,” the fourth search term, was chosen because of the nature of the global societal changes caused by the rapid acceleration of emerging technologies. Combining “paradigm shift” with “organizational change,” “organizational learning,” and “systems thinking” restricted the search results to 79 from Google Scholar.

The search term, “appreciative inquiry,” provided insight into an emerging shift in terms of the focus of inquiry. Research using appreciative inquiry includes studies involving organizational change from the fields of medicine to business and industry. It is not limited to a specific field of research (Reed & Turner, 2005; Wright & Baker, 2005) (Bjorkman & Sundgren, 2005; Hanna, Newman, & Johnson, 2000).

Appreciative inquiry is asset-based and focuses on the life-giving elements of an organization when it operates at its best (Cooperrider et al., 2003). In a study in the United Kingdom, researchers found that appreciative inquiry served as an empowerment tool for health care workers, citing how participants felt they could influence
organizational change after their involvement in the appreciative inquiry process. Additional findings revealed that health care services were more patient-centered as the study progressed. Participants reported barriers being removed as different groups within the organization worked collaboratively to solve challenges within the organization (Reed & Turner, 2005). In another medical study using appreciative inquiry, researchers reported quality interactions with participants that revealed a deeper understanding of professional motivation and quality of work (Wright & Baker, 2005).

A study conducted in Sweden affirmed the power of appreciative inquiry in helping to eliminate traditional political barriers within an organization (Bjorkman & Sundgren, 2005). Employee involvement in the relationship between the production of goods and services and the efficiency of the organization was affirmed by United States researchers in a similar study environment (Hanna et al., 2000).

Appreciative inquiry posits that the approach be complimentary from the beginning (Whitney, 1998). It offers an innovative approach to create and understand change and recognizes the power of words to determine the direction of inquiry. The use of appreciative inquiry helps to reveal the conditions that traditionally handicap relationships among members of an organization (Bleakley, Farrow, Gould, & Marshal, 2005). By focusing on the life-giving forces of an organization and helping members of the organization reflect on a time when it was at its best, appreciative inquiry can become a powerful tool in the change process. Appreciative inquiry is emerging in many areas of society and offers a fresh perspective on the change process (Duerr, 2004).

The use of appreciative inquiry in a study conducted in a rural Kansas community helped stakeholders realize their communal assets and capitalize on the collective “gifts”
of this small town. City leaders, school officials, and citizens shared their aspirations for their community and in doing so revealed through the process a vision for how their small community could maintain its vibrancy (Fast, 2005).

The use of appreciative inquiry in the educational setting is beginning to emerge as a viable tool for inquiry and research. Appreciative inquiry offers a new paradigm for studying the challenges in education by viewing these challenges with a focus of inquiry that advances the social capital of the organization (Cooperrider et al., 2003).

Combining “appreciative inquiry” with “organizational change,” “organizational learning,” “systems thinking,” and “paradigm shift” yielded five search results from Google Scholar. Of the five results, three were books, one was an integrated studies research paper for graduation requirements for a Masters of Arts degree, and the remaining one was an article that focused on the gap in organizational development between theory and practice. Empirical research that supported the integration of organizational change, organizational learning, systems thinking, paradigm shift, and appreciative inquiry was not found. ERIC FirstSearch and InfoTrac OneFile Plus yielded no empirical research results when combining the five search terms.

Little empirical research that specifically examines the teaching environment where students have laptop computers exists. The research that does exist is limited to technology integration efforts or the use of computer-assisted software in instruction (DeLuca, 2003; Iheanacho, 1997; McMillan & Honey, 1993; Murphy, King, & Brown, 2002; Parks, Huot, Hamers, & Lemonnier, 2003; Pownell, 2002; Russell & Abrams, 2004; Schaumburg, 2001a, 2001b; Trimmel & Bachmann, 2004; Williams, 2002). For this study, I have chosen to focus on empirical research targeted at laptop computer use.
Using Google Scholar, I searched the Internet for prominent studies using the keywords “high school.” This search yielded 424,000 “hits.” “High school” was chosen as the first keyword due to the high number of results returned with the search. For the second keyword, multiple terms were taken into consideration: “ubiquitous computing,” “one-to-one learning,” “laptop initiative,” “laptop program,” “anytime anywhere learning,” and “pervasive computing.” Each term implies student access to a wireless laptop computer. The common word, whether spoken or implied, in each set of the previous terms is laptop. Deliberation was given to substituting the search term “laptop” for “emerging technology”; however, results in ERIC FirstSearch and Infotrac OneFile Plus yielded additional empirical research when the search term “laptop” was used. Following the search term “high school,” “laptop” was added to narrow the outcome. Results for the combination of “high school” and “laptop” yielded 4,900 results. The third search term was “teaching,” because of its strong tie to the research questions in this study. The results were narrowed to 3,040. Following the addition of the term “teaching,” The term “learning” was added. Again, the choice for the keyword “learning” derives from the word choice directly embedded in the research questions. The results were narrowed to 2,720. “Kansas” was the last search term. This addition of “Kansas” yielded 341 results, all of which were reviewed for relevance to this study.

Of the final 341 results that were reviewed, none contained empirical research conducted in Kansas that was directly related to the research topic. Out of the 341 results, I focused on the seven studies as they related to providing a technology-rich teaching environment through the introduction of emerging technologies in schools, specifically laptop computers.
The secondary search of empirical research concentrated on emerging technologies in the high school teaching environment, specifically research that examined the introduction of laptop computers into the technology-rich teaching environment.

Research that focused on emerging technology in high schools included the following: handheld computers and personal digital assistants, virtual reality, online learning, distance education, probeware and software, learning via the Internet, technology access across various societal lines and cultures, changes in post-secondary education and pre-service teacher preparation, professional staff development, and the impact of budgeting on hardware, software, and infrastructure upkeep. A broad theme of change emerged as the research was reviewed. Changes in teacher pedagogical practices and changes in student learning-related behaviors appear to be intertwined, categorized here as “school change.”

School Change

A study of three urban high schools focused on 247 ninth-grade students, 168 of their parents, and 24 teachers to determine the success of technology integration and a laptop computer program. This study revealed that teachers reported success with technology integration and an increase in student motivation. The research also found teacher knowledge of technology use in instructional practices and attitudinal changes to be critical for sustained organizational change. Students reported that school was more fun when they used technology, and they were more confident using computers (Murphy et al., 2002).

Additionally, a year-long study that included 8th-grade students revealed that these students found their science and English teachers were more likely to implement project-
based learning and more inquiry-based instruction with them when they had access to laptop computers. The teachers were also more likely to use inquiry-based instructional activities and do more projects with their students. In turn, students scored better on holistic measurement of their writing skills, including a sharp increase in persuasive communication, idea organization, and increased vocabulary. They also wrote more than students who did not have laptop computers. Over the course of the year, student collaboration among peers was common (McMillan & Honey, 1993).

Two European studies were conducted in Germany. A longitudinal study of a laptop computer program in a German high school used videotaped lessons, including 24 students with laptop computers and 21 students without laptop computers, to determine if students were more independent and worked more collaboratively. Researchers found that teachers relied less on worksheets and traditional instruction via the chalkboard. Students also worked longer on individual projects using their laptop computers than their counterparts who did not have laptop computers. They also relied less on paper and pencil; instead, they chose to use their laptop computer for writing, composition, and written expression. Students and teachers agreed that laptop computers offered advantages to promoting teamwork and collaboration (Schaumburg, 2001b).

In another German high school study that included 45 students with laptop computers in their third year of a laptop computer program and 68 students who only had access to desktop computers via the school’s computer lab, set out to determine if there was a difference in computer knowledge and computer confidence between the two groups. Researchers found that gender differences dissipate in technology literacy skills
when students use laptop computers, which may indicate a correlation between computer experience and technology confidence (Schaumburg, 2001a).

Interviews from a study conducted in a laptop computer immersion program in Canada revealed that teachers were more likely to integrate multimedia technology into all areas of the curricula and chose to assign student work that bridged the classroom and the larger external community. Researchers found that teachers placed an emphasis on creating meaningful opportunities for learning that were substantive and challenging. Teachers were also found to work more collaboratively on student projects that involved two or more teachers or were cross-curricular in design. Teachers who adopted high levels of technology integration in their instructional practices tended to use portfolios as a form of assessment to document student progress (Parks et al., 2003).

In a study of laptop computer use in classrooms that took place over 19 months, technology was viewed by the students as a minimal detractor from the routine experience of the class. Students took disruptions caused by technical difficulties in stride and reported minimal distraction. Students who used laptop computers, when compared to students who did not, were found to have increased spatial abilities and stronger computer skills, and both genders showed increased confidence in technology-related skills. Students who had access to laptop computers were found to be more diligent and persevere through difficulties more than their non-laptop computer counterparts on an achievement motivation scale (Trimmel & Bachmann, 2004).

A year-long study that focused on students using laptop computers in a high school anatomy and physiology class found that students with full-time access to laptop computers, multimedia software, and presentation creation software had higher
achievement levels. Citing the way in which laptop computers are used within the context of teaching and not as a separate component to learning, researchers theorized that student use of laptop computers may be a more authentic application of their knowledge of technology use when compared with students who used a traditional computer laboratory or bank of computers in the back of a classroom (Siegle & Foster, 2001).

Chapter Summary

The literature review began with an overview of the conceptual framework, followed by an explanation of the epistemology of social constructionism; discussion of the theoretical frameworks of organizational change, paradigm shift, appreciative inquiry theoretical research perspective and the competing perspective of critical theory; and a brief discussion of the speed of change. An overview of the search methodology was also discussed.

Limited information that directly relates to one-to-one laptop initiatives with organizational change, organizational learning, systems thinking, paradigm shift, and Kansas is available. The convergence of technology, information, and communication are challenges for educators who are faced with preparing students for the Digital Age. Appreciative inquiry offers a viable resource for addressing the changes necessary to prepare students to successfully live and work in the technology-rich 21st Century.

Consistent with this literature review is the introduction of how laptop computers impact teacher pedagogy and student learning. Specific areas of change in the school setting become intertwined as teacher and student behaviors are both altered because of the introduction of laptop computers. An appreciative inquiry theoretical research perspective allows the opportunity to describe and identify teacher and student
perceptions of the impact of one-to-one laptop computer access. An appreciative inquiry theoretical research perspective also provides a specific direction of inquiry that expressly looks at the positive nature of each student possessing a wireless laptop computer on teaching and learning at Sedgwick High School. The literature review concluded with a discussion of relevant empirical research that examines emerging technologies in schools and one-to-one laptop computer learning initiatives that influenced change within schools.

Chapter 3 includes the methodology, purpose of the study, research questions, research design, research participants, data collection methods and procedures, and data analysis procedures.
CHAPTER 3
Methodology

Chapter 3 of my dissertation includes methodology, purpose of the study, research questions, research design, research participants, and data collection methods and analysis procedures.

Teacher and student perceptions of the impact of one-to-one laptop computer access were viewed through the theoretical frameworks of organizational change (Schein, 1995) and paradigm shift (Kuhn, 1962, 1996), followed by integration of the appreciative inquiry theoretical research perspective (Cooperrider & Srivastva, 1987). A qualitative embedded, descriptive case study applied the appreciative inquiry theoretical research perspective to describe and identify teacher and student perceptions of the impact of one-to-one laptop computer access during the fall of 2005.

Purpose of the Study

The purpose of this study was to describe and identify, through an appreciative inquiry theoretical research perspective, teacher and student perceptions of the impact of one-to-one laptop computer access. The perceptions of Sedgwick High School teachers and students of the impact of one-to-one laptop computer access were studied through the theoretical frameworks of change (Schein, 1995), paradigm shift (Kuhn, 1962, 1996), and an appreciative inquiry theoretical research perspective (Cooperrider & Srivastva, 1987).

Research Questions

1. How do teachers in a technology-rich high school environment describe the impact of one-to-one laptop computer access?
2. How do teachers in a technology-rich high school environment describe the impact of one-to-one laptop computer access on student-learning?

3. How do students in a technology-rich high school environment describe the impact of one-to-one laptop computer access?

4. How do students in a technology-rich high school environment describe the impact of one-to-one laptop computer access on how their teachers teach?

Context

At the time of this study I was employed as the Director of Curriculum and Technology for Sedgwick Public Schools, USD 439, and chose the research site based on the school district’s role as a recognized technology leader in Kansas and nationally (Atomic Learning, 2005). USD 439 was in the fourth year of a one-to-one laptop computer initiative and offered a technology-rich school environment suitable for this study. I sought to understand the benefits to teaching and learning that USD 439’s one-to-one laptop computer program had for teachers and students.

The research site for this study was Sedgwick, Kansas, a small rural community approximately 22 miles north of Wichita, Kansas, and five miles west of the I-135 interstate corridor. Sedgwick had a population of 1,630 residents and represented a bedroom community for Wichita, Kansas, and the surrounding Sedgwick County. Many community members were employed in the aircraft industry in Wichita or for several of the larger companies in and around Wichita (City of Sedgwick, 2005).

The largest employer in Sedgwick is USD 439, consisting of Sedgwick High School and R. L. Wright Elementary. While the city of Sedgwick is only one square mile in size, the school district encompasses 42 square miles. Enrollment figures for 2004-
2005 reflect 542 students enrolled district-wide (City of Sedgwick, 2005; Kansas State Department of Education, 2005b; Sedgwick Public Schools, 2005). Enrollment figures also include three- and four-year-old students who receive special education services, as well as services for special education students until they are 21 years of age. There were 393 students at R. L. Wright Elementary school enrolled in pre-kindergarten through eighth grade during the 2004-2005 school year (Kansas State Department of Education, 2005a). Student enrollment at Sedgwick High School during the 2004-2005 school year was 149, with 51% male students and 49% female. Approximately 17.45% of the students were identified as economically disadvantaged (Kansas State Department of Education, 2005b). The ethnic breakdown for Sedgwick High School included: 90% Caucasian/White, 7% Hispanic, and 3% “Other.” Racial ethnicity for the City of Sedgwick is similar. According to the 2000 census, the City of Sedgwick had 1,537 residents, with 95% of the residents identified as Caucasian/White, 3% as Hispanic, and 2% identified as Other. The average median household income in 2000 was $44,934, with 60% of the residents employed in areas of manufacturing, industry, transportation, or education. Less than 1% of the residents were involved in agriculture (U.S. Census Bureau, 2000).

Between 1994 and 2005, USD 439 enrollment increased nearly 30% (Sedgwick Public Schools, 2005). In 1992, USD 439 created the district’s first computer network, linking desktop computers for each classroom teacher through a simple computer network that connected the high school with the grade school. The network allowed teachers to submit their grades electronically and students to play with simulation and skill reinforcement software, as well as the word processing of simple reports (Apple
With the advent of the 2000-2001 school year, wireless Apple iBook laptop computers were purchased for most teachers throughout the school district. In May 2002, the school board authorized school officials to purchase wireless Apple iBook laptop computers for each 11th and 12th-grade student to use during the 2002-2003 school year (Niles, 2003). In 2003-2004 school year, all sophomores received a wireless Apple iBook laptop computer (Apple Computer, Inc. undated).

**Research Design**

This study used a qualitative, embedded case study research design to describe and identify teacher and student perceptions of the impact of one-to-one laptop computer access. Embedded within the context of the study were two units of analysis: 13 teachers and 18 students in grades 10 through 12. The application of an embedded case study design allowed for the focus of the study to be narrowed to the units of analysis most affected by wireless laptop computers in the research context (Yin, 1984).

**Research Perspective**

This study was designed around the premise that a positive core is embedded in the use of emerging technologies at Sedgwick High School. An appreciative inquiry theoretical research perspective allowed the inquiry to be focused on the positive core inherent within the organization and its members (Cooperrider et al., 2003). Inherent in appreciative inquiry theoretical research perspective is the generative process of sense-making that occurs as participants collectively share their beliefs and attitudes (Cooperrider & Srivastva, 1987).
Research Participants

Participants in this study were purposively sampled based on recommendations made by the high school principal and the guidance counselor from the list of current teachers and students in grades 10, 11, and 12. Participants included 13 full-time high school teachers of grades 10, 11, and 12, and 18 students comprised of six students each from grades 10, 11, and 12. Seventeen teachers could have participated in this study; four teachers chose not to participate in this study.

Each of the three student grade level focus groups was comprised of three males and three females from each grade level and represented an academic balance of abilities. The socio-economic status of participating students was balanced as well.

In purposively selecting teacher participants, the following factors were considered: gender, certification and licensure, and years of service. Factors considered in the purposive sampling of students included gender, socio-economic status, and academic performance. I met with all students in grades 10, 11, and 12 and explained the study to them. I provided the students with an assent form and a consent form for their parents. Students who chose to volunteer to participate were asked to return the assent and consent forms. Participants were purposively selected from the group of students who returned the assent and consent forms, and volunteered for participation.

Data Collection Procedures

In order to describe and identify teacher and student perceptions of the impact of one-to-one laptop computer access, the following methods were used: focus groups and the left-hand and right-hand column case method (LHRHCCM) (Argyris, 1999). Separate focus groups were conducted with six 10th grade students, six 11th grade...
students, six 12th grade students, and 13 high school teachers. Twelve of the thirteen teachers who participated in one of the three teacher focus groups also completed the LHRHCCM. Protocols for the focus group are found in Appendix C. Furthermore, an emerging research design was used where appropriate.

*Focus Groups*

Focus groups facilitated the understanding of teacher and student perceptions of the impact of one-to-one laptop computer access (Bogdan & Biklen, 2003). Inherent in appreciative inquiry theoretical research perspective is the generative process of sense-making that occurs as participants collectively share their beliefs and attitudes (Cooperrider & Srivastva, 1987). The use of focus groups allowed for sense-making to occur. Additionally, the use of focus groups allowed me to collect data from multiple participants at the same time (Patton, 2002).

Questions for each focus group, framed from an appreciative inquiry theoretical research perspective, were structured similarly to those from the *Appreciative Inquiry Handbook* (Cooperrider et al., 2003). The three student focus groups in this study were comprised of six students each from the 10th grade, 11th grade, and 12th grade. The protocol and questions for the student focus groups are found in Appendix B.

Each student focus group had a balance of gender, socio-economic status, and academic performance. Academic performance was defined as the cumulative grade point average (GPA). Each focus group was comprised of three students with a 3.0 GPA or higher on a 4.0 scale and included three students with a 2.99 GPA or lower, and three males and three females. Data were collected from a focus group of purposively sampled teachers from the Sedgwick High School faculty. The teacher focus group in this study
included 13 high school teachers. The protocol and questions for the teacher focus group are in Appendix A.

Focus group questions were piloted with students and teachers from a pool of volunteers who did not participate in the study to check for understanding, clarity, and relevancy of information elicited from participant responses.

*Left-Hand Right-Hand Column Case Method*

The LHRHCCM is a method used to collect data related to issues that constituents of a group or organization may be reluctant to discuss. It is used to reveal underlying beliefs, attitudes, and values held by the participant who is completing the instrument. By using LHRHCCM, participants often reveal what they are thinking but feel they cannot openly express (Argyris, 1999).

The LHRHCCM requires the participant to respond to a situation with which he/she may be familiar by constructing a conversation between the participant and another teacher, administrator, or student, respectively. In this constructed conversation, participants share their perceptions of the impact of one-to-one laptop computer access. When the constructed conversation is completed, participants write on the left-hand column of the paper their thoughts, feelings, or ideas they may be reluctant to discuss openly. The left-hand side of the paper reveals the feelings or thoughts that participants may be hesitant to express openly; these tacitly held feelings or thoughts are called undiscussables. The LHRHCCM promotes openness to the questioning of “why certain things are always done this way” and allows participants to reflect in a double-loop learning process on the tacitly held thoughts and feelings that they would not normally share (Argyris, 1999). The LHRHCCM was purposively administered to teachers in
Sedgwick High School who chose to participate in this study. Twelve of thirteen teachers completed the LHRHCCM. The LHRHCCM protocols may be found in Appendix C.

Data Analysis

All focus groups were recorded and transcribed. Each focus group was transcribed verbatim, and the LHRHCCM was transcribed electronically. Data were analyzed by using the comparative analysis matrix method. Analyzed data included transcripts from the teacher focus group, transcripts from the student focus groups, and LHRHCCM results. A constant comparative analysis was used to identify patterns, code data, and categorize findings (Miles & Huberman, 1994).

Data were analyzed using text analysis software and content analysis by sorting data into a series of matrices based on the study’s theoretical perspectives. The text analysis software used is known as CATPAC.

CATPAC is a self-organizing neural network that is optimized for reading text. It can read any ASCII text and learn the underlying concepts conveyed by the text. CATPAC provides both a complete neural network of the interrelationships among the chief words in the text, along with a diameter-method cluster analysis of the main meanings. (Woelfel, 1990, p. 10)

By using CATPAC to identify closely related concepts, key themes emerged from the data based on the logical patterns of how words were linked. The analysis also provided data clusters where words were in correlation and proximity to each other. The data clusters suggested themes that were common in the transcribed teacher and student data. Each cluster of related words represented different themes.
Research Quality

For purposes of this study, the quality of the data gathering process was gauged by focusing on the creditability, dependability, transferability, and confirmability of the study, and its data and data collection procedures (Lincoln & Guba, 1985). Credibility was determined by using member-checking to confirm what was said and what may have been meant by what was said at the end of each focus group. Focus group participants were given the opportunity to review the findings and then given the opportunity to expound on perspectives shared in the original focus group meetings. Moreover, I used triangulation determined through various methods (teacher focus groups, student focus groups, and LHRHCCM) and through the data collected from subunits within each of the units of analysis shared with the participants to ascertain their credibility. Claims are not made relative to the transferability of the data.

I maintained a rich description of the data collection process that included personal notation regarding each focus group and administration of the LHRHCCM (Bogdan & Biklen, 2003; Merriam, 1998). The dependability of the study was strengthened through the embedded case study protocols in the data collection procedures to minimize errors and bias (Yin, 1984). Moreover, the use of an emerging research design allowed for the description of changes that occurred in the research context and how they affected the way the study was approached (e.g., shifts in data collection).

Confirmability of the data was ascertained through interaction with the participants of the study who reviewed the findings of this study and provided verification of the findings. No data were disputed.
Researcher Bias

I realize, as an administrator in USD 439, the potential for personal bias exists. I made every effort not to influence participants or allow personal bias to influence the data analysis and interpretation of the findings. To minimize bias, I followed predetermined protocols for each focus group, and in the procedures, instructions, and materials for participants in the LHRHCCM.

Chapter Summary

A qualitative embedded case study design was used to describe and identify, through an appreciative inquiry theoretical research perspective, teacher and student perceptions of the impact of one-to-one laptop computer access. Thirteen teachers and 18 students participated in this study. Data collection methods included focus groups with each of the units of analysis. The LHRHCCM was used to collect additional data from teachers. Data were analyzed using text analysis software and content analysis by sorting data into a series of matrices based on the study’s theoretical perspectives. A constant comparative analysis was used to identify patterns, code data, and categorize findings. Chapter 4 presents the findings of the four research questions.
CHAPTER 4

Chapter 4 presents the results from the findings of this study, including a brief review the purpose of this study, the theoretical perspectives, methodology, data analysis, research questions, and a summary of the findings.

The purpose of this study was to describe and identify, through an appreciative inquiry theoretical research perspective, teacher and student perceptions of the impact of one-to-one laptop computer access. The theoretical perspectives of change (Schein, 1992) and paradigm shift (Kuhn, 1962, 1996) were filtered through an appreciative inquiry theoretical research perspective (Cooperrider & Srivastva, 1987).

This study used a qualitative, embedded descriptive case study research design (Yin, 1984) to describe and identify teacher and student perceptions of the impact of one-to-one laptop computer access. Data were collected through teacher and student focus groups, as well as through the administration of the LHRHCCM. Data were initially analyzed using the comparative analysis matrix method (Miles & Huberman, 1994), which provides the basis for presenting the data in table form throughout this chapter.

The findings in the tables are presented as data collected from teachers and students, and cross-categorized with the study’s three primary theoretical perspectives: change, paradigm shift, and appreciative inquiry. In the tables below, I used the appreciative inquiry term—positive core, to represent data related to appreciative inquiry. Galileo text analysis software (CatPac II) was used to provide a deep analysis of the data. CatPac II software is an intelligent neural networking program that reads digital text documents, provides frequencies of words, graphic analysis, and identifies the central concepts within the text (Woelfel, 1990).
This study answered the following four research questions:

1. How do teachers in a technology-rich high school environment describe the impact of one-to-one laptop computer access?
2. How do teachers in a technology-rich high school environment describe the impact of one-to-one laptop computer access on student-learning?
3. How do students in a technology-rich high school environment describe the impact of one-to-one laptop computer access?
4. How do students in a technology-rich high school environment describe the impact of one-to-one laptop computer access on how their teachers teach?

Summary of Findings

Six salient findings were based on the analysis of data. They are listed below. Then the findings were separated and the results of each finding reported using examples of the comments from the study’s participants to illustrate the finding.

1. Students functioned in the capacity of teacher.
2. Technology changed the way teachers and students communicated.
3. The culture of the classroom dynamics between teacher and student changed.
4. Technology made learning enjoyable for students.
5. Teachers and students believed immersion in a technology-rich learning environment created advantages for student success after high school graduation.
6. Teachers believed access to ubiquitous technology created new challenges for maintaining student engagement in the learning process.
Finding 1: Students Functioned in the Capacity of Teacher

Data collected from Sedgwick High School teachers and students revealed that students often function in the capacity of teacher. Teachers and students described experiences where students were the source of instruction. These experiences occurred in several different classrooms and in various situations, including the English department, the social studies department, and the science and vocational departments. Teachers and students described the role that the student assumed when functioning in the capacity of teacher. Teachers and students commented that the teacher relinquished some classroom control when allowing students to function in the capacity of teacher.

Teachers and students also described their personal feelings and reactions to opportunities when the student functioned in the capacity of teacher. Table 4.1 offers comments by teachers and students as they relate to this first finding. The comments supporting Finding 1 are distributed across the three theoretical perspectives of this study and are categorized accordingly.
Table 4.1

Students Functioned in the Capacity of Teacher

<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
</table>
| Organizational Change   | The scariest thing [for me] is not knowing how to do this. Once you start learning how to do it, it is a heck of a lot easier to say, ‘all right.’ When you give it up to the computers that’s a pretty scary thing [for me].  
I hate to use this word, but it has forced me to give up some of the power and control in the classroom.  
I know I was pretty excited when the students showed me how they could iChat their homework to me.  
11 similar comments | It makes them [teachers] want us to teach them how to do stuff. It opens their eyes to new projects.  
Some of the teachers had to actually use students to figure out some things to do on the computer.  
I know a couple of classes I’ve been asked to come in and help the teacher with the computers so they can figure out how to use the certain programs.  
12 similar comments |
<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paradigm Shift</td>
<td>They [students] have started to understand that it is cool to be the kid that goes up in front of the class.</td>
<td>I noticed that we [the students] are becoming the teachers.</td>
</tr>
<tr>
<td></td>
<td>I don’t want to say they are running the show, but they are driving more of the instruction these days.</td>
<td>It just helps you interact more with your teachers on a person-to-person basis instead of a student-to-teacher basis.</td>
</tr>
<tr>
<td></td>
<td>When you realize that chaos isn’t going to break out. Cats and dogs aren’t going to start living together, then, it’s all right. We’re still going to survive. They’re still going to learn.</td>
<td>I’ve been asked to come in a couple of classes and help the teacher out with the computers so they can figure out how to use the certain programs.</td>
</tr>
<tr>
<td></td>
<td>I would say it was scary when I moved here. I was scared to death to give up that power and control. I was used to being in charge of everything; to come here and to give up control, it scared me. I’ll be honest. It did. Now, it doesn’t. Now, it’s as if this is just an everyday thing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>We have to relinquish power to allow students to teach us how to use the software.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>It’s not always easy, but it definitely is wonderful when everything clicks into place. Students take control and enjoy teaching others and being able to accomplish more than ever before.</td>
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<tr>
<td></td>
<td>3 similar comments</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.1 (continued)

<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Core</td>
<td>Sometimes they [students] have done things that I don’t know how to do and I am like, ‘that’s cool! Show me what you did. Anytime they [student] can show you how to do something, they enjoy that [experience]. You can see it in their eyes. 2 similar comments</td>
<td>It makes us feel smarter. It feels good. [When teaching others] You’re cool. It makes you feel like you have more power. I showed [name] at least half a dozen times. It is like a learn-learn process. You’re teaching the teachers things at the same time that they are teaching you. And they are like, ‘Wow! You can do that?’ We just help each other. Like, if you figure something out, then you’ll show somebody else how to do it and then they might show somebody else, and it is like a chain.</td>
</tr>
</tbody>
</table>

Students and teachers recognized the change from the teacher being the only instructor in the classroom. Now, students were instructors as well. One teacher shared how students introduced him to new communication technology tools. He said, “I know I was pretty excited when the students showed me how they could iChat their homework to me.” Another teacher shared a similar experience, “Sometimes they have done things that I don’t know how to do, and I am like, ‘that’s cool! Show me what you did.’” The data indicated that students felt important when they taught teachers new technology skills. When teachers learned from students the interaction between the two groups affirmed the
assets of the organization. The affirmation of this relationship helped strengthen the positive core that existed within Sedgwick High School. One teacher said, “Anytime they can show you how to do something, they enjoy that. You can see it in their eyes.” One teacher explained how her students are more at ease with their role as teacher, “They have started to understand that it is cool to be the kid that goes up in front of the class.”

Teachers relinquished control in the classroom when students functioned in the capacity of teacher. Teachers and students reported that when students functioned in the capacity of teacher, the teacher had to relinquish control of the teaching and learning process. The paradigm shift of relinquishing control was not easy for some teachers. One teacher explained, “I hate to use this word, but it has forced you to give up some of the power and control in the classroom.” She went on to explain, “I don’t want to say they [students] are running the show, but they are driving more of the instruction these days.” Another teacher said, “It isn’t always easy, but it definitely is wonderful when everything clicks into place. Students take control and enjoy teaching others and being able to accomplish more than ever before.”

A teacher explained his evolution in relinquishing power and control in the classroom and the associated paradigm shift, “When you realize chaos isn’t going to break out . . . They’re still going to learn.” Another teacher explained how difficult it was to change:

The scariest thing [for me] is not knowing how to do this. Once you start learning how to do it, it is a heck of a lot easier to say, ‘all right.’ When you give it up to the computers that’s a pretty scary thing [for me].
Another teacher described his fear of losing control when he offered a comparable experience during his tenure at Sedgwick High School. He said:

I would say it was scary when I moved here. I was scared to death to give up that power and control. I was used to being in charge of everything; to come here and to give up control, it scared me. I’ll be honest. It did. Now it doesn’t. Now it’s as if this is just an everyday thing.

A teacher’s description summarized what other teachers felt regarding the relinquishing of control of the teaching and learning process, “We have to relinquish power [in the classroom] to allow students to teach us how to use the software.”

Students also recognized their role in the learning process when the teacher relinquished control in the classroom. One student said, “I noticed that the students are becoming teachers.” Concurring, another student offered a an example of his role as teacher, “I’ve been asked to come in a couple of classes and help the teacher out with the computers so they can figure out how to use the certain programs.”

Students described their experiences of teaching new technology skills to teachers. Skills spanned from setting up instant messaging software to helping a teacher configure the instant messaging software “at least a half a dozen times.” Students described their sense of importance when teaching teachers how to use technology. A student shared, “It feels good.” Students internalized the paradigm shift and positive core that were associated with the transfer of power in the classroom from teacher to student, “It makes you feel like you have more power.” The sense of feeling important was related to the students’ sense of accomplishment. “It makes us feel smarter,” offered another student. Another student said, “[when teaching others] you’re cool.” One student felt a
sense of accomplishment because of the chain reaction from helping other teachers and students to learn how to use the technology. He said, “We just help each other. If you figure something out, then you’ll show somebody else how to do it, and they might show somebody else . . . it is like a chain.”

One student shared how teaching teachers to use the technology presented a win-win opportunity for teachers and students. Another student reflected on the advantages of teachers understanding technology and knowing how to use the software, “It makes them [the teacher] want us to teach them how to do stuff. It opens their eyes to new projects that we can use [for future assignments].”

A new relationship evolved out of this transfer of power and control. One student said, “It is a learn-learn process. You’re teaching the teachers things at the same time that they are teaching you.” Additionally, a student explained the benefits of his new role, “It helps you interact more with your teachers on a person-to-person basis instead of a student-to-teacher basis.”

Finding 1 Summary

Data revealed that students functioned in the capacity of teacher. Students and teachers recognized the change that occurred, the paradigm shift from teacher to student as teacher, and a positive core of experiences identified by teachers and students when students functioned as the teacher. Students expressed that they felt important when they taught teachers. They also felt important when they shared their knowledge with classmates. An overarching sense of self-accomplishment pervaded the student responses. Student accomplishments in the capacity of teacher were also acknowledged by teachers.
Finding 2: Technology Changed the Way Teachers and Students Communicated

Technology applications, such as email and instant messaging, created opportunities for teachers and students to interact outside the traditional communication patterns. Traditional teacher-student boundaries became invisible through the use of email and instant messaging, and influenced how teachers and students perceived their relationship with others outside the classroom.

Technology created opportunities for teachers and students to expand how they communicated. Table 4.2 offers comments by teachers and students as they relate to Finding 2. The comments supporting this finding are distributed across the three theoretical perspectives of this study and are categorized accordingly.

Table 4.2
Technology Changed the Way Teachers and Students Communicated

<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Change</td>
<td>I can talk to them [students] anytime.</td>
<td>It gives you a chance to be noticed when you don’t think that you are.</td>
</tr>
<tr>
<td></td>
<td>[We talk] About anything [electronic communication].</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I know more about them…I can communicate when I need to.</td>
<td>I think students talk to students more because of it [electronic communication].</td>
</tr>
<tr>
<td></td>
<td>[iChat] Maybe they don’t want people to hear what they are saying.</td>
<td>I talk about sports [electronic communication].</td>
</tr>
</tbody>
</table>
Table 4.2 (continued)

<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Change</td>
<td>I think the whole communication thing… has helped me to stay in touch with former students.</td>
<td>I’m always talking to [teacher name].</td>
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<tr>
<td></td>
<td>I think some … I don’t know whether they feel that they don’t want to ask in class. They don’t want to ask me personally to my face or something. I think they feel email is more comfortable.</td>
<td>[Many voices]—we just talk [electronic communication].</td>
</tr>
<tr>
<td></td>
<td>My students email me a lot. I personally just don’t get on the iChat. I’m doing other things. I don’t do a lot of iChatting, but they [students] email assignments or they will email me questions.</td>
<td>Just the person-to-person relationship with iChat.</td>
</tr>
<tr>
<td></td>
<td>15 similar comments</td>
<td>With our college classes, I haven’t had a teacher over the TV yet, but you can email them and send your assignment in that way instead of just pencil and paper.</td>
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<td></td>
<td></td>
<td>Yeah, we talk to them [the teachers] more, I guess.</td>
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<tr>
<td></td>
<td></td>
<td>I talk to [teacher name] about softball.</td>
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<tr>
<td></td>
<td></td>
<td>My mom and I …strictly email because she works at a bank and all of the programs have to be secured, and iChat or anything like that isn’t secure.</td>
</tr>
<tr>
<td>Theoretical Perspective</td>
<td>Teachers</td>
<td>Students</td>
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<tr>
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</tr>
<tr>
<td>Organizational Change</td>
<td></td>
<td>I’ve been emailing my uncle in Arizona for the past couple of weeks.</td>
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<td></td>
<td></td>
<td>I can talk to my cousin all the time. She lives in New York [electronic communication].</td>
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<td></td>
<td></td>
<td>Yeah, actually I was on iChat last hour with my cousin in Iowa and he and I were just messing around.</td>
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<td></td>
<td></td>
<td>I talk to my cousin in Tennessee [electronic communication].</td>
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<tr>
<td></td>
<td></td>
<td>I get emails every once in a while from my mom. If I need something, I will email her, but not like all the time.</td>
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<tr>
<td></td>
<td></td>
<td>5 similar comments</td>
</tr>
<tr>
<td>Paradigm Shift</td>
<td>You get on iChat. It’s private. They can say things to you. You can say things to them that would never happen the other way [face-to-face].</td>
<td>It’s not so much a student teacher; it’s more of a friend-to-friend kind of thing. I’m saying that we are more equal because of it. Because of the technology.</td>
</tr>
<tr>
<td></td>
<td>They don’t feel embarrassed [asking for help via iChat].</td>
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</table>

Table 4.2 (continued)
<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
</table>
| **Paradigm Shift**      | When I am home with my sick kids and I open it [instant messaging software] during 5th hour, the hour that I know they’re [students] going to be there, they’re like, ‘we don’t know what we’re doing.’ So, we’ve actually used the talking back and forth [via the instant messaging software] and I’ll explain it from home. So, they knew what they were doing.  

Over the summer, I had my laptop home and [student name] IM’d [instant messaged] me. He said ‘What’s up?’ And … he spent half the year last year not even liking me. He said, ‘I just got back from the dentist and what are we going to do cool in art this year?’  

Also students are able to send their assignments to you and ask questions. I forgot to turn off iChat [instant messaging] when I went home and I had students’ iChatting me at home. If I happen to be on the computer and they [students] ask questions about assignments. That’s something you could never, never have done before.  

4 similar comments | I think they are not like a teacher, but like as a friend when they talk to you. One time I was having a bad day in class, well, like a bad week, and one of my teachers [name] IM’d [instant messaged] me and asked me what was wrong … then we started talking through IM. I don’t normally talk to [teacher] that much. I was like, ‘Oh, somebody cares.’  

[Teacher name] and I have a lot in common that we have noticed lately. Like our music choice … so whenever we talk on the Internet, it’s usually about music or different songs that we’ve heard over the weekend or something like that.  

2 similar comments |
Table 4.2 (continued)

<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
</table>
| Positive Core           | I’m not the world’s friendliest person probably. But it’s true, kids are emailing me going hey, how’s your day? Okay. And you?  
On the positive side, like [teacher name] said and [teacher name] did too. Where kids will get online and ask for help.  
I can share music. [Student name] is sharing Comic Life [software]. It brings things down to a personal level. I like it in that sense a lot.  
1 similar comment | Just the person-to-person relationship with iChat is… real … with the computers you’re able to talk to whoever you want. I mean everyone gets on iChat. You can talk to anyone anywhere. You just feel so much closer … You can talk about maybe something that you don’t want to talk about in front of other people.  
…Through IM, … normally I don’t talk to my teacher that much. Yeah, I was like, ‘Oh, somebody cares.’ |

Teachers and students remarked how technology created opportunities for interaction in non-traditional ways. Through the use of instant messaging, one teacher shared how he could “talk to them [students] anytime.” When asked to elaborate on the topics teachers and students discussed via instant messaging, another teacher added, “[we talk] about anything.”

Non-traditional forms of communication created insights for teachers into understanding their students. One teacher explained his feelings about the use of electronic communication with students when he said, “It’s good.” Another teacher said, “[with electronic communication] I can know more about them and I can communicate when I need to.”

Several teachers commented how instant messaging was used to help students with their homework and how it presented opportunities for students to contact teachers.
One teacher underscored the positive core of instant messaging with students when he said, “On the positive side . . . kids will get online and ask for help.” Another teacher shared an example of how the use of instant messaging created an opportunity for students to receive instruction from the teacher who was at home during the school day with a sick child. She said:

When I am home with my sick kids and I open it [instant messaging software] during 5th hour, the hour that I know they’re [students] going to be there, they’re like, ‘we don’t know what we’re doing.’ So, we’ve actually used the talking back and forth [via the instant messaging software] and I’ll explain it from home. So, they knew what they were doing.

Instant access to the online grading program by students and their parents has created opportunities for grading information to be obtained without having to work through the teacher. One teacher shared, “Mid-term or progress reports are not as important to parents and students because they are in contact [have access via the Internet] with their grades any time of the day and anytime they want.” Another teacher explained how she was able to help her students with assignments; she also electronically communicated with them outside of the traditional 50-minute class period. She said:

Also, students are able to send their assignments to you and ask questions.

I forgot to turn off iChat [instant messaging] when I went home and I had students’ iChatting me at home. If I happen to be on the computer and they [students] ask questions about assignments. That’s something you could never, never have done before.
Another teacher described a similar change in an electronic communication experience with students, “My students email me a lot. I personally don’t get on the iChat [instant messaging] . . . but the emailing, they [students] email assignments or they will email me questions.”

One teacher commented that when students ask for assistance using instant messaging, “[students] they don’t feel embarrassed.” Another teacher explained the rational for assuming a lack of embarrassment by a student when asking for help electronically, “They don’t want to ask me personally to my face . . . I think they feel more comfortable [contacting teacher electronically].”

In addition, teachers and students used electronic communication to interact outside the school’s traditional communication patterns. Teachers and students reported that electronic communication was not limited to academics; it included personal or social components as well. One teacher shared the benefit of instant messaging on a personal level. He said, “You get on iChat, it’s private. They [students] can say things to you. You can say things to them. That would never happen the other way [face-to-face].” One teacher suggested the reason students use instant messaging was privacy. “Maybe they don’t want people to hear what they are saying.”

One student noted the opportunities of electronic communication between teachers and students on a social level, “Just the person-to-person relationship with iChat is, I mean this is a real…with computers you’re able to talk to whoever [teacher] you want. I mean everyone gets on iChat.”

Other students offered examples of how technology created opportunities for electronic communication on a personal level. A student described how electronic
communication allowed her to get more attention from her teachers, “It gives you a chance to be noticed when you don’t think that you are.” Another student added, “I think teachers talk to students more because of it [instant messaging].”

A student explained how technology allowed him to understand his teacher, “[Teacher name] and I have a lot in common that we have noticed lately. Like our music choice . . . and so whenever we talk on the Internet, it’s usually about music or different songs that we’ve heard over the weekend . . .”

Teachers also commented how electronic communication enhanced personal communications with students. The teacher explained, “I can share music. [The student] is sharing ComicLife [software] and it brings things down to a personal level in some ways.”

The positive nature of electronic communication was expressed by teachers and students. One teacher offered an example of how he used email to interact with a student and how the interaction changed his relationship with the student, “I’m not the world’s friendliest person probably. But it’s true. Kids are emailing me going, ‘Hey! How’s your day?’ ‘Okay, and you?’”

Several students commented on the positive nature of electronic communication. One student said, “It’s not so much a student [to] teacher, it’s more of a friend-to-friend kind of thing.” One student was excited about electronic communication, “You can email them [teachers] and send your assignment in…instead of just pencil and paper.” One student spoke of her teacher, “I talk to [teacher name] about softball.”

Another student described his relationship with a teacher. He explained how technology allowed him to understand his teacher on a deeper personal level. He
described the change in their relationship, “[Teacher name] and I have a lot in common that we have noticed lately . . . our music choice . . . we talk on the Internet…”

Another student said:

I think they are not like a teacher, but like as a friend when they talk to you. One time I was having a bad day in class, well, like a bad week, and one of my teachers [name] IM’d [instant messaged] me and asked me what was wrong . . . then we started talking through IM. I don’t normally talk to [teacher] that much. I was like, ‘Oh, somebody cares.’

In addition to the positive communications that occur between the teacher and student was the increase of frequency of communications. One teacher commented, “My students email me a lot . . . They [students] email assignments or they will email me questions.” A student reported, “Yeah, we talk to them [the teachers] more . . .”

Student and teacher use of communication technology was not restricted to just between student and teacher. Students used instant messaging and email to communicate with one another and other non-teacher adults. The students used communication technology as a device to maintain communication with significant people in their lives such as parents, grandparents, and other relatives.

Students offered examples of communication outside the academic realm using instant messaging and email. One student shared his communication with his mother, “. . . my mom and I …strictly email because she works at a bank and all of the programs have to be secured, and iChat or anything like that isn’t secure.” Another student said, “I do get emails every once in a while from my mom. If I need something, I will email her.” Several students shared of using electronic communication to interact with distant
relatives. “I’ve been emailing my uncle in Arizona for the past couple of weeks.”

Students contacted cousins in New York, Tennessee, and Iowa. One student explained, “I can talk to my cousin all the time. She lives in New York.” The other student offered, “I talk to my cousin in Tennessee.” The third student said, “Last hour I was on iChat with my cousin in Iowa and he and I were just messing around.”

Teachers described how students communicated with other individuals outside of the school setting, “They talk to grandparents . . . or friends through chat.” Another example of communicating outside the traditional academic area is the teacher use of iChat to stay in touch with former students. One teacher said, “The whole communication thing has helped me to stay in touch with former students.” Another teacher described the paradigm shift she experienced when one of her students initiated an electronic conversation during the summer. She said:

Over the summer I had my laptop [at] home and [student name] IM’d [instant messaged] me. ‘What’s up?’ He spent half the year last year not even liking me. He’s said, ‘I just got back from the dentist, and what are we going to do cool in [class] this year?’

*Finding 2 Summary*

Technology changed the communication patterns of teachers and students in several ways: They shared electronic conversations about academics and social or personal areas of interest. Electronic communication, including instant messaging, and email, created opportunities for teachers and students to interact outside the traditional teacher-student relationship. The use of technology eliminated the traditional teacher-student boundaries and replaced them with instant access to electronic communication.
tools, including email and instant messaging. Teachers and students changed their patterns of communication with individuals outside of the school setting.

**Finding 3: The Culture of the Classroom Dynamics Between Teacher and Student has Changed**

The emerging use of technology changed the classroom dynamics between the teacher and the student. Teachers and students believed teachers talked less with the use of technology. Teachers and students noted changes in the teacher’s teaching role. More teacher and student individual learning was occurring. Students spent more time with self-directed learning.

Teachers and students acknowledged that the teacher’s role changed from expert to facilitator and learner. The change in the traditional teacher role of expert to facilitator created a paradigm shift in the accepted practice of assigning homework or projects. Students were given choices when demonstrating their knowledge of content on assignments and projects. They were allowed to choose the tool that best exemplified their understanding of the presented content.

Teachers and students believed technology had enabled teachers to be more effective in their instructional practices. Table 4.3 offers comments by teachers and students as they relate to Finding 3. The comments supporting this finding are distributed across the three theoretical perspectives of this study and are categorized accordingly.
Table 4.3

The Culture of the Classroom Dynamics between Teachers and Students has Changed

<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Change</td>
<td>It has changed my teaching.</td>
<td>… when it’s on the computers, they don’t really have to explain it.</td>
</tr>
<tr>
<td></td>
<td>Mine [teaching] is slowly changing … realizing what else is out there.</td>
<td>Communications in the classes are [sic] quieter that way.</td>
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<td></td>
<td>I think that I do try to give them a little more freedom that what I maybe used to.</td>
<td>I think it can help when you learn it on your own because you understand it better.</td>
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<td></td>
<td>You used to try to do labs, and it wouldn’t work and the kids would say, ‘Newton’s Second Law doesn’t work.’ You’d say, ‘well, we’ve got a few problems here. There are some errors.’ And now there is not that issue. You do get Newton’s Second Law to be proved or within 10, 20 or 30%. So, you can actually prove some of these things [before the use of technology].</td>
<td>We kind of like to learn our own things. If one thing doesn’t work, then you try something else before we ask someone.</td>
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<td></td>
<td>I think the technology gives the kids other avenues to express their knowledge.</td>
<td>There’s not just one approach, like their [teacher] way to do it. You can figure it out on your own. They let us learn it for ourselves on some stuff.</td>
</tr>
<tr>
<td></td>
<td>Every student learns differently and if used correctly the computers can help teachers find a way for every student.</td>
<td>I think it makes it easier on the teachers because they can just say, ‘all right, get out your laptops, and get on the Internet and research.’</td>
</tr>
<tr>
<td></td>
<td>It [technology] has changed what we teach.</td>
<td>On reports you don’t necessarily have to just write a paper … you can make an iMovie or a PowerPoint or something else.</td>
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<td></td>
<td></td>
<td>If kids want to do it, if they have a choice of what they are going to do, they are going to do it and they are going to want to make it good… because it’s theirs…</td>
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<tr>
<td>Theoretical Perspective</td>
<td>Teachers</td>
<td>Students</td>
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<tr>
<td>Organizational Learning</td>
<td>I think I try to find new ways to use the technology that we have. 31 similar comments</td>
<td>To write a report, you have different options on what you can do. It [technology] makes everything less stressful and more laid back. You don’t get into trouble. You’re not sitting there talking out loud in class and disrupting everybody else. 16 similar comments</td>
</tr>
<tr>
<td>Paradigm Shift</td>
<td>It’s made my job a lot easier. I don’t do as much lecturing as I used to. I think we have to be ahead of the game and adapt. I think it’s changed more from a master of all knowledge to just a facilitator in the classroom. I look at myself and I’m trying to coordinate things that are going on especially in my classes where I have two classes going at once. Like, ‘you guys get busy over here, you guys are doing this.’ (It) probably wouldn’t be picture perfect. In classrooms, I sit in the back and if they have questions, they can come up and ask me instead of me roaming. I think the second part is realizing that our kids are growing up [with technology] and that we have to change our paradigm of what we are used to.</td>
<td>Before we had computers [teacher] would drag on and on and on about little things. But now, it’s like when [teacher] explains it, he almost can tell us to go to certain websites so we can actually see a visual of cells dividing … it actually helps the learning process to see the visual. I think it’s even harder to read about cells dividing and not see a visual. I remember in [teacher’s class], it totally changed when we got our laptops…. I mean it went from ‘Sit down and read!’ to just being able to get on the computer and work things out. 2 similar comments</td>
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<tr>
<td>Theoretical Perspective</td>
<td>Teachers</td>
<td>Students</td>
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<tr>
<td><strong>Paradigm Shift</strong></td>
<td>We have to realize that the first five years of their lives – they are growing up in technology. Being here 30 years, I can go from point A to point B, and like [teacher] says I was here when it [technology] first started. And, I fought it. I’ll tell you that right now. I fought it tooth and nail, typing. And, I wasn’t going to use the dang computers. [Now,] I’ll never go back. We need to be able to adapt to that [technology] because they [students] are not used to growing up the way we used to. We have to realize what they [students] are coming into, when they come into our world. We need to adapt to [technology] …. [students] start out younger and younger, even before they hit school, playing computer games or [using] technology. I think we have to be ahead of the game and adapt to that as well. I take more of a backseat. I give objectives and the kids decide how they are going to meet those objectives. They have more choices.</td>
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Table 4.3 (continued)

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<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
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<tbody>
<tr>
<td>Paradigm Shift</td>
<td>You know, even when I first got here, we were trying to integrate some technology; going from teaching in a lab where I first taught computer classes, to now … sometimes you can be stuck … but now you are able to go wherever you want and have your classes work.</td>
<td>7 similar comments</td>
</tr>
<tr>
<td>Positive Core</td>
<td>Allowing students to choose the way of representing the materials lets them use their strengths. It is a way of building self-esteem from their own knowledge, especially for the students who tend to be poor achievers.</td>
<td>[Teacher] used to make us do that anyway [use the help menu]. Like if we didn’t get something, he’d be like, ‘go try something else.’ Now we do it on our own. It gives you a sense of independence.</td>
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<tr>
<td>Theoretical Perspective</td>
<td>Teachers</td>
<td>Students</td>
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</tr>
<tr>
<td>Positive Core</td>
<td>You used to make poster boards. You don’t have to make the old fashioned poster boards anymore. They can do it anyway they want. If they want to make a poster board, they make a poster board. If they want to make an iMovie, they make that. So it gives them the ability to use their strengths …and their knowledge. Some kids aren’t good at writing. Some kids aren’t good at speaking. If they can make a movie or something like that, we still get the knowledge, we know they know it, but they get to use their strengths and their creativity to do it.</td>
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One teacher cited how technology changed her instructional practices, “It’s made my job a lot easier. I don’t do as much lecturing as I used to.” Another teacher described the paradigm shift in his instructional practice:

I can’t speak for the things somewhere else, but I can speak about the way we used to be. You know, even when I first got here. We were trying to integrate some technology; going from teaching in a lab where I first taught computer classes to now . . . Now, you are able to go wherever you want [technology] and have your classes work.

Another teacher explained how her instructional practices were evolving, “My [instructional practices] are slowly changing, just realizing what else is out there.” One teacher said, “It [technology] has changed my teaching.” Another teacher described an example of the change in class:
Like [teacher name] said, science, poster boards, and things, you still have to do them. Dissecting . . . where you used to draw pencil things and label. . . . now we do it with Fireworks [graphics software program] . . . with a picture and then label the parts [digitally].

Teachers recognized the shift of the learning and teaching paradigm. A teacher stated, “I think we have to be ahead of the game and adapt.”

Data from teachers and students revealed the use of technology-supported transformation of the teacher’s role from imparter of knowledge to facilitator of instruction. One teacher explained how his role in the classroom had shifted with the introduction of technology:

I think it’s [being the teacher] changed more from a master of all knowledge to just a facilitator in the classroom. And I look at myself and I’m just . . . trying to coordinate things that are going on especially in my classes where I have two classes going at once . . . ‘you guys get busy over here, you guys are doing this.’

One teacher explained why he felt he needed to change his role in the classroom, “Our kids are growing up in this [technology] and that we have to change.”

Another teacher felt it was important for students to be offered choices in the classroom, “Allowing students to choose the way of representing the materials, lets them use their strengths. It is a way of building self-esteem from their own knowledge, especially for the students who tend to be poor achievers.” Another teacher said, “It’s the ownership of the project that is the main thing. If they are interested in it, then they will take ownership.”
One teacher invested student choices with personal ownership:

I always try to figure out when I’m instructing or giving a project ‘Can they take ownership in it and does it affect them personally?’ They buy in. Once you get them to buy in, they are going to produce a quality product.

A teacher explained his support of student choices for demonstration of knowledge, “I think that I do try to give them a little more freedom than what I maybe used to.” Another teacher said, “I take more of a backseat. I give objectives and the kids decide how they are going to meet those objectives. They have more choices.”

Another teacher described her paradigm shift in instructional practices:

You used to make poster boards. You don’t have to make the old-fashioned poster boards anymore. They can do it anyway they want to. If they want to make a poster board, they make a poster board. If they want to make an iMovie (movie making software), they make that. So it gives them the ability to use their strengths. Some kids aren’t good at writing. Some kids aren’t good at speaking. If they can make a movie … [they acquire] the knowledge. We know they know it … they get to use their strength and their creativity to do it.

One teacher explained how technology affected the science experiments and made her a better teacher:

You used to try to do labs–and it wouldn’t work . . . the kids would say, ‘Newton’s Second Law doesn’t work.’ You’d say, ‘well, we’ve got a few problems here. There are some errors.’ And, now [with technology] you get Newton’s Second Law proved—or within 10, 20 or 30%. So, you can
actually prove some things that you couldn’t prove [before the use of technology].

One teacher said, “It [technology] has changed what we teach.” Another teacher offered, “. . . I try to find new ways to use the technology that we have.”

Students were presented with choices of how to demonstrate their knowledge of content or key concepts. One teacher said, “I think the technology gives the kids other avenues to express their knowledge.” Another teacher commented, “Every student learns differently, and if used correctly, the computers can help teachers find a way for every student.”

A teacher explained a change in his teaching style during his tenure at Sedgwick High School:

Being here 30 years, I can go from point A to point B, and like [teacher] says, I was here when it [technology] first started. And I fought it. I fought it tooth and nail, typing. And, I wasn’t going to use the dang computers. [Now] I’ll never go back.

The influences of technology on teacher instructional practices were explained by teachers who pointed out the importance of adaptation. One teacher described the need for adaptation in instructional practices, “We need to be able to adapt to that [technology] because they [students] are not growing up the way we used to.” Another teacher said:

We have to realize what they [students] are coming into, when they come into our world. We need to adapt to [technology] . . . [students] start out younger and younger, even before they hit school, playing computer
games or [using] technology. I think we have to be ahead of the game and adapt to that as well.

Changes in instructional practices were described by teachers and students. Several students shared that they felt teachers talked less with the use of technology. Two students from two separate focus groups articulated identical comments when they both said, “They [teachers] don’t talk as much.” Two other students also offered similar responses when they said, “They don’t explain it to us” and “It’s like when it’s on the computers, they [teachers] don’t really have to explain it.” A student indicated how one teacher talked less and changed instructional practices:

Before we had computers [teacher] would drag on and on and on about little things. But now, it’s like when [teacher] explains it, he almost can tell us to go to certain websites so we can actually see a visual of cells dividing … it actually helps the learning process to see the visual. I think it’s even harder to read about cells dividing and not see a visual.

Students also talked about the role that student self-directed learning played in the learning process. One student said, “I think it can help when you learn it on your own more because you understand it better.” Several students explained the process they used when using self-directed learning. One student explained, “Now we kind of do it on our own. It gives you a sense of independence.” Another student commented, “I think we like to learn our own things. If one thing doesn’t work, then you try something else.” Another student said, “There’s not just one approach, like their [teacher’s] way to do it. You can figure it out your own way . . . you remember it.”
Data from students revealed that they were also cognizant of the teacher’s changing role in the classroom. One student said, “I think it makes it easier on the teachers because they can just say, ‘all right, get out your laptops, and get on the Internet and research.’”

Data from students also revealed that they were cognizant of the opportunity for choice when demonstrating concepts or content specific information. One student said, “. . . on reports you don’t necessarily have to just write a paper. You can make an iMovie or a PowerPoint or something else.” Another student made a connection between a mandatory way of doing an assignment and wanting to do an assignment, “If kids want to do it, if they have a choice of what they are going to do, they are going to do it, and they are going to want to make it good because it’s theirs.”

Another student illustrated how using technology allowed for multiple options. She explained, “To write a report you have different options on what you can do. It [technology] makes everything less stressful and more laid back.” Another student described the options technology presented with one word, “freedom.” He went on to explain how the technology created other options in student assignments, “The kind of assignments we can do is more open . . . more of a range . . . you can go into PowerPoint, iMovie, instead of a paper.”

Data revealed some students also believed that technology made the teachers better teachers. A student described a transformation in one of his teachers, “I remember in [teacher’s class], it totally changed when we got our laptops. I mean it went from ‘Sit down and read!’ to just being able to get on the computer and work things out on there.”
One student talked about how teachers maintained better classroom control by using technology, “You don’t get into trouble. You’re not sitting there talking out loud in class and disrupting everybody else.”

**Finding 3 Summary**

Teachers and students believed the culture of the classroom dynamics between them changed through the use of technology. Individual, self-directed learning increased. Teachers and students acknowledged instructional practices for the teacher’s role changed from imparter of knowledge to a facilitator. Technology presented students with an array of options for demonstrating their grasp of knowledge.

**Finding 4: Technology Made Learning Enjoyable for Students**

Students liked learning with technology and believed technology made learning enjoyable because it offered them opportunities for creativity and learning from one another. An overarching sense of fun was associated with learning using technology. Students liked learning from each other and enjoyed the novelty of learning with technology. For most students using technology to generate a project created pride in their work. Table 4.4 offers comments by teachers and students as they relate to Finding 4. The comments supporting finding four are distributed across the three theoretical perspectives of this study and are categorized accordingly.
Table 4.4
Technology Made Learning Enjoyable for Students

<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Change</td>
<td>Our kids enjoy it [learning with technology].</td>
<td>It’s so much better to have your books on your computer than to lug them around.</td>
</tr>
<tr>
<td></td>
<td>When you get kids asking for extra work, that is when there’s progress and something clicks. And they enjoy it.</td>
<td>It makes it easier.</td>
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<td>I think that [the use of technology] is one way they can make, in my case [subject] fun for the kids.</td>
<td>I think it’s just easier.</td>
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<td></td>
<td>We did a PowerPoint on a couple of different diseases and the student researched them. I learned a lot because there were things that I didn’t know about them as well. The kids tended to listen more or watch more if it is on Power Point.</td>
<td>I have better grades here. Well, with the computers, I have straight A’s, here and there I had D’s and F’s.</td>
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<td></td>
<td>I really think PowerPoint presentations are great. Kids get into it. They see things that they understand.</td>
<td>It makes you want to do your work. It’s more fun to do.</td>
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<tr>
<td></td>
<td>2 similar comments</td>
<td>They [other classmates] can help you on each part of it and you understand it better.</td>
</tr>
<tr>
<td>Paradigm Shift</td>
<td>Kids really got into that because I think they were affected by it.</td>
<td>When you’re doing a project [using technology] you’re always learning. You’re learning how to do certain things.</td>
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<tr>
<td></td>
<td>3 similar comments</td>
<td>You look at some people that know a lot about computers, like before we actually had this. And I’m like, ‘Wow! What a geek!’ and then you actually get into what it is all about and it is actually kind of cool.</td>
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<td></td>
<td>We are all geeks.</td>
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<tr>
<td></td>
<td></td>
<td>Heck ya, it is (cool).</td>
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<tr>
<td>Theoretical Perspective</td>
<td>Teachers</td>
<td>Students</td>
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</tr>
<tr>
<td>Paradigm Shift</td>
<td>I think it makes it easier on the teachers, too, because when you have more options, we don’t have as many restrictions.</td>
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<td></td>
<td>5 similar comments</td>
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<tr>
<td>Positive Core</td>
<td>I think they have more opportunities and … I think that can be good in a lot of ways … and the laptop opens a lot of doors for them.</td>
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<td></td>
<td>I just get excited watching a kid getting a smile on his face because he does something that he didn’t think he could do.</td>
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<td></td>
<td>1 similar comment</td>
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<td></td>
<td>I mean most everything is done on computers, and once you start learning them you start feeling like you have importance in the world.</td>
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<td></td>
<td>You are proud of it [when completing an assignment that used technology]. It’s the final product. With the final product, you’re actually seeing it and keeping it. Then … you can show your family and friends.</td>
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<td></td>
<td>He [the teacher] got excited because a few of the movies he thought were really, really cool. He would take the computer [projects] … and show other teachers. That really made us proud as students … to be shown off to other teachers by your teacher really makes you feel good.</td>
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<td></td>
<td>I made an iMovie of our street racing … and put music to it … and I showed it to -- heck everybody that I hang out with, and they all thought it was cool, so it gave me a sense of joy.</td>
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</tbody>
</table>
Teachers believed that students liked learning with technology. One teacher described how students reacted to learning with technology, “Our kids enjoy it.” Another teacher affirmed that comment when he said, “When you get kids asking for extra work, which is when there’s progress and something clicks. And they enjoy it.” Learning with technology was associated with an overarching sense of enjoyment. Another teacher commented how technology made the learning of his specific subject enjoyable for the students, “I think that [the use of technology] is one way they can make, in my case [subject] fun for the kids.”

The novelty associated with learning an assignment using PowerPoint was an enjoyable learning experience for the students. One teacher spoke about science class on PowerPoint:

We did PowerPoint on a couple of different diseases and the students researched them. I learned because there were things that I didn’t know about them [the diseases] as well. The kids tended to listen more or watch more if it is on the Power Point.
Another teacher agreed, “I really think PowerPoint presentations are great. Kids get into it. They see things that they understand.”

Another teacher spoke of an experience where technology made learning enjoyable. She said:

[We were] studying the speed of sound. You can talk about the speed of sound and ‘yeah this is how big it is’ and ‘use all these numbers and equations.’ And, then to actually pluck a carpet tube, have two blocks and the sound probe when you click the blocks together . . . and we proved the speed of sound within 10%. It was the probes with Lab-Pro [software]. We used a microphone . . . with the Lab-Pro and [classroom] technology. The kids just kinda stood there ‘it really works!’ ‘Yeah it really works.’

Teachers and students believed that students felt pride in their work when using technology. One teacher said, “I just get excited watching a kid getting a smile on his face because he does something that he didn’t think he could do.” Pride associated with a particular technology project prompted another teacher to say, “Kids really got into that [technology project] because I think they were affected by it.”

Students also felt pride when they used technology. When asked about how the use of technology made him feel, one student said, “You know—WOO HOO!” Another student said, “Success” and another said, “Exciting.” Another student described presenting a movie he had created for one of his classes:

He [the teacher] got excited because a few of the movies he thought were really, really cool. He would take the computer [projects] . . . and show
other teachers. That really made us proud as students . . . to be shown off
to other teachers by your teacher really makes you feel good.

Another student described a similar experience of the pride he felt in the final
product he created using technology. He said, “You are proud of it [completing an
assignment that used technology]. It’s the final product. With the final product, you’re
actually seeing it and keeping it. Then . . . you can show your family and friends.”

The pride associated with the influence of technology was expressed by several
students. “I have a lot better grades here. Well, with the computers I have straight A’s,
here and there [at her previous school] I had D’s and F’s.” Another student shared, “I
mean most everything is done on computers, and once you start learning them you start
feeling like you have importance in the world.”

A student explained the group process associated with a technology project and
shared, “When you’re doing a project, you’re always learning. You’re learning how to do
certain things.” In rapid succession, four students described the benefits of working
together and learning from one another on a project that used technology. Student A said,
“Look at how much stuff you can do.” Student B said, “Exactly.” Student C said, “And
how many people you can help with it.” Student D concluded, “Definitely, Definitely.”
Another student said, “You’re not just stuck on one thing that everybody is doing.”

A sense of enjoyment for learning with technology was expressed by several
students. Laughing, one student said, “I think computers have made school somewhat
better and more fun.” Similar comments from other students also reiterated the notion
that learning with technology was fun. One student said, “It makes you want to do your
work. It’s more fun to do.” Another student said, “I think it [using the technology] makes better projects.”

Students liked learning with technology. One student said, “It’s so much better to have your books on your computer than to lug them around.” Two students summarized why they liked learning with technology, “It makes it easier” and “I think it’s just easier.” One student also felt that technology made teaching easier for teachers, “I think it makes it easier on the teachers, too, because when you have more options, they don’t have to give as many restrictions.”

Students enjoyed learning together when it was associated with technology. One student described why he liked doing group projects, “They [other classmates] can help you on each part of it and you understand it better.” Another student said, “I just think it [the use of technology] made it easier to do an iMovie instead of trying to like glue down pictures [on a poster].” The technology projects were opportunities for students to have fun while learning.

The following dialogue between two students illustrates their belief that the novelty of knowing how to use technology and the fun associated with it was a dominant feeling among other classmates. Student A said:

You look at some people that know a lot about computers like before we actually had this [laptops]. And I’m like, ‘Wow! What a geek!’ Then you actually get into what it is all about and it is actually kind of cool.

Student B said, “We are all geeks.”

Student A concluded, “Heck ya, it is (cool).”
Another student told a story of his success with a racing movie he created. He described the novelty and fun associated with creating the movie:

I made an iMovie of our street racing . . . and put music to it . . . and I showed it to --heck everybody that I hang out with, and they all thought it was cool, so it gave me a sense of joy.

Another student said, “You could write a paper, but it wouldn’t be very fun.” Another student described the fun associated with experiencing a paradigm shift by saying, “Like what they teach us here now, most the stuff is fun to learn, like the [technology] projects and the different things.”

Finding 4 Summary

Teachers and students believed technology made learning enjoyable for the student. An overarching element of enjoyment existed when technology was used. Students liked learning together and from one another. The novelty of learning with technology created opportunities for students to have fun and to feel pride in their work.

Finding 5: Teachers and Students Believed Immersion in a Technology-Rich Learning Environment Created Advantages for Student Success after High School Graduation

Data revealed that teachers and students expressed similar hopes and dreams for students’ futures. Teachers described a vested interest in the personal success of their students and offered examples of personal commitment to those students. Teachers felt that student success transcended the classroom and extended beyond the classes being taught. Students believed they could be successful because of the opportunities presented by technology. Table 4.5 offers comments by teachers and students as they relate to
Finding 5. The comments supporting this finding are distributed across the three theoretical perspectives of this study and are categorized accordingly.

Table 4.5

Teachers and Students Believed Immersion in a Technology-Rich Learning Environment Created Advantages for Student Success after High School Graduation

<table>
<thead>
<tr>
<th>Theoretical Perspectives</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Change</td>
<td>I’d say we have probably the best if you want your son or daughter to learn how to use modern technology. This school would be it. I think they need to know that their kids [students] are going to have every opportunity … it’s going to be up to them to take advantage of that [technology] in the right way. 4 similar comments</td>
<td>I think it [technology] just helps prepare you for the life that you’re getting ready to live and go out into [society]. I have thought about real estate or design architecture [as a career], and all the programs that are on the computer … It’s awesome. Some kids don’t even know what they’re good at until they get on there [the computer/internet] and learn about it [subject] . . . and they could choose a totally new career. 5 similar comments</td>
</tr>
<tr>
<td>Paradigm Shift</td>
<td>What we have tried to provide, you can’t get in a textbook. We want productive members of society…It (technology) makes them more productive. I think the technology makes them well-rounded individuals, too. It [technology] gives them all kinds of avenues, doesn’t it?</td>
<td>You’re definitely going to have an advantage if you know more than the people that don’t [know technology] and have to get [computer] training.</td>
</tr>
</tbody>
</table>
Table 4.5 (continued)

<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
</table>
| **Paradigm Shift** | It levels the playing field a little bit in my opinion.  
It will give them an edge when they go out to compete for jobs.  
When they get out in life, technology will give them an edge over other kids to be successful.  
4 similar comments | [Teacher] made us do an assignment on two careers and accounting. I want to be an accountant and it was really neat just to learn how much [money] they make, what they do. Like how many different types of accountants there are … and that just makes me want to be it more and more.  
We have appreciated the technology. It makes it better for us to learn. We did not realize the potential for the learning. |
| **Positive Core** | How better to prepare kids for the future than putting the technology that they are going to need after they get out of school in their hands now?  
I would like to think that all of them leave here with a better understanding of technology and are able to use it either in college… or going right … to work … I’m hoping that something that they did with the technology here will help them.  
That’s I guess if I had a dream concerning the students that I teach it’s that they’re going to be successful someday. I think this [technology] is one more thing to help most of them be more successful | It [technology] maybe makes you think that you can achieve more than you thought you could.  
The technology here has actually helped the dream become more of a reality.  
Some kids want to go into a certain field but they don’t hardly know anything about it … they get on the computer and they realize what they can do on it. If you want to be a computer programmer … you get on here and really get good at it, you would really realize that you could do it … you just push hard and you could do it. |
Table 4.5 (continued)

<table>
<thead>
<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
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<tbody>
<tr>
<td>Positive Core</td>
<td>I guess the dream would be that all of them take it [technology] and run with it and use it because they’re going to have to know how to use it. The more we can teach them here, the further ahead they’re going to be down the road. It is my kids performing what they want to do, not necessarily even in technology, but with the technology it will help them succeed quicker. And that is what I am after.</td>
<td>6 similar comments</td>
</tr>
</tbody>
</table>

Teachers and students believed immersion in a technology-rich learning environment creates opportunities for preparing students for success following high school graduation. Teachers shared their hopes and dreams for their students and the advantages a technology-rich learning environment provided. One teacher said, “If I had a dream concerning the students that I teach, it’s that they’re going to be successful someday and I think this [technology] is one more thing to help most of them be more successful.” Another teacher said:

I would like to think that all of them leave here with a better understanding of technology and are able to use it either in college . . . or going right . . . to work . . . I’m hoping that something that they did with the technology here will help them.
One teacher said, “I think the hopes and dreams go way back to before we had technology. It is that every kid will be what he or she wants to be. And with technology it helps them a little bit more to get to that point.”

Another teacher described the skills necessary to be successful in a technology-rich working environment:

If you are at work and you’re messing around, you’re going to get fired

. . . and you need to be able to manage what you have in front of you.

That’s the biggest thing that I’ve been trying to teach outside of the computer skills is how to remain on task.

Another teacher said, “It [my dream] is that my kids will perform what they want to do . . . with the technology, it will help them succeed quicker and that is what I am after.” One teacher said, “I guess if I had a dream concerning the students that I teach, it’s that they’re successful someday and I think this [the technology] is one more thing to help most of them be successful.” Another teacher said:

I guess the dream would be that they take it and run with it because they’re going to have to know how to use it [the technology]. The more we can teach them here, the further ahead they’re going to be down the road.

Several teachers described the advantage of Sedgwick High School students’ immersion in technology, “I’d say we have probably the best [technology-rich learning environment] if you want your son or daughter to learn how to use modern technology. This school would be it.” Another teacher said, “I think they [the parents] need to know
that their kids are going to have every opportunity laid out in front of them and it’s going to be up [the student] to take advantage of that in the right way.”

Teachers and students believed immersion in a technology-rich learning environment created opportunities for preparing students for success following high school graduation. One teacher described his belief that by providing technology for students in USD 439, he was preparing them for life after graduation, “How better to prepare your kids for the future than putting the technology that they are going to need after they get out of school in their hands now.” Articulating similar beliefs another teacher said, “What we have tried to provide, you can’t get in a textbook.” Another teacher said, “We want productive members of society . . . It [technology] makes them more productive.” Another teacher echoed similar sentiments when he said, “I think the technology makes them more well-rounded individuals, too.”

Teachers and students expressed a common belief that technology offered opportunities that would not have been available if they were technologically illiterate. One teacher said, “It [technology] gives them all kinds of avenues, doesn’t it?” Another teacher said, “It kind of levels the playing field a little bit in my opinion. One teacher said, “It [technology] will give them an edge when they go out to compete for jobs.” Similarly, another teacher commented, “The technology will give them an edge over other kids as far as the success they are going to have.”

Students expressed comparable comments when they described the advantage of a technology-rich learning environment following high school graduation. One student said, “I think it [technology] just helps prepare you for the life.” Another student commented, “It [technology] . . . you think that you can achieve more than you thought
you could.” One student said, “You’re definitely going to have an advantage if you know more than the people that don’t [know technology] and have to get [computer] training.”

Another student offered an example of how she viewed the advantage created by technology for helping achieve her goal of a career in design architecture or real estate. She said, “I have thought about real estate or design architecture, and all the programs are for that are on the computer . . . It’s awesome.” One student described an example of how the use of technology helped students believe they could be successful when researching a career as an accountant:

[Teacher] made us do an assignment on two careers and accounting. I want to be an accountant and it was really neat just to learn how much they make, what they do. Like how many different types of accountants there are…and that just makes me want to be it more and more.

Another student said:

Some kids want to go into a certain field but they don’t hardly know anything about it … they get on the computer and they realize what they can do on it. If you want to be a computer programmer … you get on here and really get good at it, you would really realize that you could do it … you just push hard and you could do it.

Another student explained how technology created an opportunity to pursue his dream of a career in the medical field, “The technology here has actually helped the dream become more of a reality.” Another student said, “We have appreciated the technology. It makes it better for us to learn. We didn’t realize the potential for the learning.”
**Finding 5 Summary**

Immersion in a technology-rich learning environment created a belief among teachers and students that students could be successful. They offered similar comments when they described the advantages presented by immersion in a technology-rich learning environment. This type of learning environment supported the dreams teachers held for their students. Students believed immersion in a technology-rich learning environment created an advantage for their success following high school graduation.

**Finding 6: Teachers Believed Access to Ubiquitous Technology Created New Challenges for Maintaining Student Engagement in the Learning Process**

Teachers believed that access to technology created distractive issues for both teachers and students. Instant messaging and the distractions associated with access to the Internet were frequently given as examples. Teachers and one student described distractions created from the use of technology; however, teachers articulated their challenges and described in detail the distractions they observed with students. Students did not appear to consider access to technology as a challenge. Only one student mentioned access as causing a distraction.

Table 4.6 offers comments by teachers and students as they relate to Finding 6. The comments supporting this finding are found in the theoretical perspective of change. There was no evidence related to this finding in the areas of paradigm shift and positive core.
Table 4.6

Teachers Believed Access to Ubiquitous Technology Created New Challenges for Maintaining Student Engagement in the Learning Process

<table>
<thead>
<tr>
<th>Theoretical Perspectives</th>
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<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Change</td>
<td>I know it [instant messaging] can be a problem because at times it has affected my teaching.</td>
<td>A teacher doesn’t always want you to be on iChat. They would rather have you doing your work and most of the time you’re doing both … you get caught and they get a little mad at you.</td>
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<tr>
<td></td>
<td>They’re [students] always on iChat … I am on IM [instant messaging] too much.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The real problem with computers is that many students abuse the “fun” features like iChat, iTunes, and downloading games. This is a problem that we as teachers can monitor … controlling it takes so much time out of instruction that it is almost not worth it.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students also get distracted by all of the bells and whistles.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Some kids would be better off without all of the distractions that technology offers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teachers have to be careful that computers don’t become a distraction.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I think the drawback of technology is that they [students] can easily be distracted and you lose focus on your assignment and then you’ve created a headache for yourself.</td>
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Table 4.6 (continued)

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<tr>
<th>Theoretical Perspective</th>
<th>Teachers</th>
<th>Students</th>
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<tbody>
<tr>
<td>Organizational Change</td>
<td>To some extent, I think their English skills go down when they’re typing and using all the slang.</td>
<td>28 similar comments</td>
</tr>
<tr>
<td>Paradigm Shift</td>
<td>No supportive data</td>
<td>No supportive data</td>
</tr>
<tr>
<td>Positive Core</td>
<td>No supportive data</td>
<td>No supportive data</td>
</tr>
</tbody>
</table>

Instant messaging was described as being distractive to the teaching and learning process. Several teachers commented on the distraction created from instant messaging on a personal level and as it impacted students. One teacher described his misdealing with instant messaging, “I know it [instant messaging] can be a problem because at times it has affected my teaching.” Another teacher related a similar comment when he said, “They [students] are always on iChat….I am on IM [instant messaging] too much.”

One teacher said:

The real problem with the computers is that many students abuse the “fun” features like iChat, iTunes, and downloading games. This is a problem that we as teachers can monitor . . . controlling it takes so much time out of instruction that is almost not worth it.

Several teachers had similar comments, “Students also get distracted by all of the bells and whistles;” “Some kids would be better off without all of the distractions that technology offers;” and “Teachers have to be careful that computers don’t become a distraction.” One teacher also said, “If they aren’t interested in it [the assignment], I think the drawback of technology is that they can easily be distracted and you lose focus on your assignment and you’ve created a headache for yourself.
Teachers discussed their concern with the use of instant messaging and students’ grammar. One teacher said, They’re used . . . to typing like they’re talking to you… and their verbal skills are down too.

The one student who thought technology might cause distractions said, “A teacher doesn’t always want you to be on iChat. They would rather have you doing your work and most of the time you’re doing both. And you get caught and they get a little mad at you.”

**Finding 6 Summary**

Access to technology creates distractive issues for both teachers and students. Teachers viewed specific aspects of technology, including instant messaging as distractive. Teachers recognized how change in the classroom from teacher centered to student-centered created an environment where technology could be the source of distractions to students. Teachers also described their concerns with the use of technology and the decline in proper grammar usage. One student described how the use of instant messaging could be distractive.

**Chapter Summary**

This chapter presented the results from findings of my study, including a brief review of the purpose of the study, theoretical perspectives, methodology, data analysis, research questions, and a summary of each of the findings. Six salient findings based on the analysis of data were as follows: (1) Students functioned in the capacity of teacher, (2) technology changed the way teachers and students communicated, (3) the culture of the classroom dynamics between teacher and student changed, (4) technology made learning enjoyable for students, (5) teachers and students believed immersion in a
technology-rich learning environment created advantages for student success after high school graduation, and (6) teachers believed access to ubiquitous technology created new challenges for maintaining student engagement in the learning process.

Chapter 5 discusses the interpretation of the six salient findings, including recommendations for future research, contributions to the profession, and contributions to practice.
CHAPTER 5

In my final chapter, I review the purpose of the study, research questions, summary of the conceptual framework, literature review, methodology, six salient findings of the study, and discussion of the findings. I then make recommendations for future research. The chapter concludes with contributions to the profession, contributions to practice, and conclusions.

Purpose of the Study

The purpose of the study was to describe and identify, through an appreciative inquiry theoretical research perspective, teacher and student perceptions of the impact of one-to-one laptop computer access. The perceptions of the impact of one-to-one laptop computer access on Sedgwick High School teachers and students were studied through the theoretical frameworks of change (Schein, 1995), paradigm shift (Kuhn, 1962, 1996), and an appreciative inquiry theoretical research perspective (Cooperrider & Srivastva, 1987).

A qualitative, embedded, descriptive case study research design was used to discover and identify, through an appreciative inquiry theoretical research perspective, teacher and student perceptions of the impact of one-to-one laptop computer access during December 2005 and January 2006. This type of perspective focuses on the positive characteristics of an organization. As a theoretical research perspective, appreciative inquiry directs the line of inquiry toward “life-giving” or generative forces within the organization and its members. The life-giving forces of the group or organization are identified as its “positive core” and identify, establish, and emphasize
the “life-giving” forces of the group or organization (Cooperrider & Srivastva, 1987; Hammond, 1998).

Research Questions

Four research questions guided my study:

1. How do teachers in a technology-rich high school environment describe the impact of one-to-one laptop computer access?
2. How do teachers in a technology-rich high school environment describe the impact of one-to-one laptop computer access on student-learning?
3. How do students in a technology-rich high school environment describe the impact of one-to-one laptop computer access?
4. How do students in a technology-rich high school environment describe the impact of one-to-one laptop computer access on how their teachers teach?

Summary of the Conceptual Framework

My experience of working with teachers and students in a technology-rich learning environment helped me to frame the conceptual framework of this study. Infused in my experience was an epistemology of social construction and theoretical framework comprised of organizational change (Schein, 1995) and the notion of paradigm shift (Kuhn, 1962, 1996). Moreover, I filtered my conceptual framework through an appreciative inquiry theoretical research perspective (Cooperrider et al., 2003). This filter allowed me to focus on the “life-giving” positive core of this technology-rich learning environment.
Summary of the Literature Review

Information that directly related to one-to-one laptop computer initiatives encompassing organizational change, organizational learning, systems thinking, paradigm shift, and Kansas was limited. The convergence of technology, information, and communication presents challenges for educators who are faced with preparing students for the Digital Age. An appreciative inquiry theoretical research perspective offered a viable resource for addressing the changes necessary to prepare students to successfully live and work in the technology-rich 21st Century.

The literature review examined how laptop computers impacted teacher pedagogy and student learning, and how specific areas of change in the school setting became intertwined as teacher and student behaviors were altered because of the introduction of laptop computers. An appreciative inquiry theoretical research perspective afforded me the opportunity to describe and identify the positive core of teacher and student perceptions of the impact of one-to-one laptop computer access. An appreciative inquiry theoretical research perspective also provided a specific direction of inquiry that expressly looked at the positive nature of each student possessing a wireless laptop computer on the teaching and the learning at Sedgwick High School as well as its impact on teachers. The literature review included a discussion of relevant empirical research that examined emerging technologies in schools and one-to-one laptop computer learning initiatives that influenced change within schools. The introduction of laptop computers into the learning environment impacted teachers pedagogical practices, including increased technology integration and more student-centered project-based instruction (McMillan & Honey, 1993; Murphy et al., 2002; Schaumburg, 2001a). Teachers did less
lecturing and more collaborative group projects in one-to-one laptop computer learning environments (Schaumburg, 2001b). Students were more likely to be authentically engaged in their learning (Parks et al., 2003; Siegle & Foster, 2001). They demonstrated perseverance in problem-solving challenging tasks (Trimmel & Bachmann, 2004).

Summary of Methodology

This study used a qualitative, embedded, descriptive case study research design to describe and identify teacher and student perceptions of the impact of one-to-one laptop computer access. Embedded within the context of the study were two units of analysis: 13 teachers and 18 students, six students each from grades 10 through 12. Eighteen students including three males and three females each from grades 10, 11, and 12 participated in one of three grade-level student focus groups. Thirteen teachers participated in one of three teacher focus groups. Twelve of 13 teachers completed the LHRHCCM. The application of an embedded case study design narrowed the focus of the study to the units of analysis most affected by wireless laptop computers in the research context (Yin, 1984).

Summary of Findings

The study revealed six salient findings based on analysis of the data. Five of the findings identified and described elements of change and the associated paradigm shifts experienced by teachers and students. The data in Finding 6 revealed new challenges for maintaining student engagement in the learning process because of the application of emerging technology through one-to-one laptop computer access. The use of an appreciative inquiry theoretical research perspective offered me the opportunity to describe and identify the positive core of Sedgwick High School as it related to the
application of emerging technology and one-to-one laptop computer access, and the challenges presented by the application of emerging technology and one-to-one laptop computer access within the organization as well.

Findings

Six salient findings were identified in this study:

1. Students functioned in the capacity of teacher.
2. Technology changed the way teachers and students communicated.
3. The culture of the classroom dynamics between teacher and student changed.
4. Technology made learning enjoyable for students.
5. Teachers and students believed immersion in a technology-rich learning environment created advantages for student success after high school graduation.
6. Teachers believed access to ubiquitous technology created new challenges for maintaining student engagement in the learning process.

Discussion of Findings

I have chosen to organize the discussion of my findings into six sections. Each section represents one of the findings from this study referenced above.

*Students Functioned in the Capacity of Teacher*

The rapid expansion of technology and the exponential growth in access to technology via the Internet impacts many facets of society (Centron & Davies, 2003). The educational environment is no exception. The rapid expansion of technology throughout society and the exponential growth in access to technology has created a paradox for teachers who are committed to preparing students for the future.
The paradox for teachers at Sedgwick High School existed in the disparity of skills they possessed and the skills they needed to master to support one-to-one laptop computer access as well as other technologies for their students. Technological literacy, including how to use different types of technology such as computers and other electronic devices, as well as the resources of the Internet, presented challenges for these teachers. In many cases, the teachers did not appear as comfortable as their students with emerging technologies and, as a result, had to rely on the students for leadership in learning how to use the available technology. Learning at Sedgwick High School emerged as bi-directional. The bi-directional learning environment at Sedgwick High School created opportunities for teachers to learn from students and students to learn from teachers, creating more of a learner-learner learning environment.

Students, when acting in the role of teacher, were empowered by teachers. Student empowerment helped to develop a sense of mutual trust. Teachers trusted students to teach them technology skills; students trusted teachers to listen to them about the applications and uses of technology. The students were teaching the teachers about the choices presented through the use of technology and in doing so helped to transfer this to the teacher’s pedagogical practices.

Preparing students to live and work in the technology-rich 21st Century requires a new skill set for teachers. The new skill set required Sedgwick High School teachers to become digital learners if they wanted to achieve or maintain technologically literacy. Achieving and maintaining technological literacy may require a paradigm shift for teachers, one that allows them to learn from their students. The new paradigm, a digital paradigm, allows for the vast expanse of available technology, coupled with Internet
resources, to serve as a catalyst for change in the learning environment (Abdelaziz, 2004). In a technology-rich learning environment, the teacher-student teaching relationship evolves where it becomes unclear who assumes the role of teacher and who is the student (Davies, 2004). The evolution helps to create a symbiotic relationship where students learn from one another, students learn from teachers, and teachers learn from students. The digital paradigm allows students to function in the capacity of teacher reversing long-established roles and creating a new paradigm for learning in the Digital Age.

Technology Changed the Way Teachers and Students Communicated

For many students, traditional forms of communication are no longer primary forms of communication and are being overshadowed by students’ use of a growing number of emerging technologies including instant messaging (Oblinger & Oblinger, 2005). At Sedgwick High School, instant messaging is a tool used by both the teacher and the student. Instant messaging and email are tools that appear to impact human interaction on a global scale. The globalization of the Internet presents opportunities for students to interact with others in different cultures, time zones, and hemispheres, causing a revolution in the way students are learning to communicate (Dyson, 1999). The students in this study joined online communities where they interacted virtually with other adults and students. This virtual interaction promoted increased electronic communication.

The increase in electronic communication among students in this study promoted a sense of anonymity and with it a sense of equality. Email and instant messaging offered these students simplicity and anonymity, two key components for social exploration and
global interaction (Francetic & Rampoldi-Hnilo, 2001). Email and instant messaging served as students’ vehicles for social exploration and global interaction, and allowed them to feel connected beyond the borders of their school. In many ways, the emerging forms of communication enabled by the one-to-one laptop computer initiative in this study resulted in the generation of bridging social capital for the students (Putnam, Feldstein, & Cohen, 2003). These students were able to build bridges across generations and borders through chat rooms, the use of avatars in online interaction, blogging, and podcasting. The generation of bridging capital helped to empower students through the sharing of ideas, knowledge, and experiences.

When students in this study communicated globally and in virtual social environments, their feeling of being connected transfused into the one-to-one laptop computer classroom. The students wanted to feel connected to their teachers and to each other. The technology, including email and instant messaging, promoted that connectedness. Now, it is routine for students to communicate via email and instant messaging, since technology has changed the way teachers and students communicate.

_The Culture of the Classroom Dynamics between Teacher and Student Changed_

In a technology-rich learning environment, there is a transformation in teacher pedagogical practices. The teacher’s transformation of pedagogical practices mirrors the students’ experience. In a technology-rich learning environment, learning occurs with technology, rather than from technology (Rockman, 2003). Teachers who embrace learning with technology create classroom environments where students are encouraged to become self-directed learners (Davies, 2004). Self-directed learning is affirmed in a student-centered classroom. The teacher assumes the role of facilitator and transcends the
traditional role of imparter of instruction. Consequently, the classroom dynamics between teachers and students in this study changed because teachers and students were now functioning in a student-centered classroom.

The new role assumed by teachers in Sedgwick High School created an opportunity for a realignment of the interpersonal teacher-student relationship that previously existed. The realignment in the interpersonal teacher-student relationships impacted how and what happened in the classroom. The introduction of a wireless environment and one-to-one laptop computer initiative helped to support the change in the classroom environment by creating an environment where form follows function.

As the teaching and learning tools changed in the classroom so did the dynamics between teachers and students. The introduction of electronic communication with email and instant messaging created opportunities for teachers and students to use both modes of communication to transfer daily assignments or distribute course content. Students also used electronic access via email and instant messaging to ask questions of the teachers, and teachers clarified instructions or defined parameters for classroom assignments. It also allowed students to collaborate with other students outside of the classroom. The ability to work together was not limited by physical proximity.

Teachers in this study shifted their instructional practices from standing in front of the class, lecture-style presentation, to a student self-directed teaching model. Additionally, technology integration helped teachers overcome isolation by allowing their students to interact instantaneously with experts in areas where the students needed information. As a result, the teachers relinquished the role of expert and assumed the role
of guide and facilitator in the acquisition of new knowledge (U.S. Department of Commerce Technology Administration, 2002).

The student-centered classrooms at Sedgwick High School now provide opportunities for the use of emerging technologies that enrich the collaborative learning process. A change in the culture of the classroom dynamics at Sedgwick High School has enhanced the way students share information, think critically, and demonstrate their understanding of new concepts. In the technology-rich learning environment of Sedgwick High School, the culture of classroom dynamics between teacher and student has changed.

*Technology Made Learning Enjoyable for Students*

The students in this study and their peers throughout the world are the first generation who will live their entire lives surrounded by the influences of multiple forms of technology, including computers, video games, cell phones, MP3 players, and Internet access. They will not experience a world without technology (Prensky, 2001). Because they have never known a world without technology, the students in this study did not appear to have any anxiety with learning and using the emerging technologies that they had access to in their learning environment. These students came to school with a familiarity with the use of technology.

The familiarity with technology experienced by the students in this study promoted self-confidence that appeared to make learning enjoyable or, to use the vernacular expressed by the students, *fun*. The learning enjoyment felt by the students in this study is a result of the freedom that comes from an environment where learners,
regardless of age or role in the organizational, learn from one another. The mutual learning process is symbiotic.

For Sedgwick High School students, learning with technology became multifaceted and dynamic. Rarely did the students thoroughly read instructions associated with a new technology presented to them in the classroom; they forged ahead and began the process of self-discovery. They enjoyed the excitement of risk-taking, trying new things, and discovery. For these students, technology introduced an element of excitement to the learning process. Students’ excitement may have resulted because they were teaching technology to their teachers.

*Teachers and Students Believed Immersion in a Technology-Rich Learning Environment Created Advantages for Student Success after High School Graduation*

Some predict that the top 10 occupations of the 21st Century will require the worker to possess computer-related skills and that technology automation will eliminate many jobs currently held by human workers. Competition for jobs in the technology-rich 21st Century will require workers to possess new skills that offer a competitive edge in a global workplace. Successful workers in the 21st Century will be required to adapt to the rapidly changing influence of technology and its associated impact on economies and society (U.S. Department of Labor, 2004).

Students who are able to successfully interact with technology, including hardware and software, as well as those who can work in teams and collaboratively problem-solve will be more desirable candidates in the workplace. Sedgwick High School offered students opportunities to practice 21st Century workplace skills on a
regular basis by providing opportunities to use technology. They routinely worked in teams, problem-solved, and successfully interacted with technology.

Teachers in schools without a technology-rich learning environment face increased challenges in preparing their students to successfully live and work in the technology-rich 21st Century. Sedgwick High School teachers recognized the advantages that daily interaction with technology offered their students. The immersion in a technology-rich learning environment provided their students with opportunities to develop self-confidence as they immersed themselves in the available technology.

The advantages provided to Sedgwick High School students using laptop computers created opportunities that may be not be available to students in other schools. For example, Sedgwick High School teachers allow students to choose learning styles and to use their strengths to complete assignments; students’ learning is enhanced and broadened because of the technology-rich learning environment connected with the learning process. Teachers and students believed immersion in Sedgwick High School’s technology-rich learning environment created advantages for student success after high school.

Teachers Believed Access to Ubiquitous Technology Created New Challenges for Maintaining Student Engagement in the Learning Process

Students are surrounded by personal technology that is mobile, virtual, electronic, instantaneous, and easily accessible. They have access to cell phones, text messaging, instant messaging, and other personal technology. Students stay connected and entertained with personal technology.
The connectedness and entertainment features of technology presented challenges for Sedgwick High School teachers. In some cases, the interaction of Sedgwick High School students with technology that is mobile, virtual, electronic, instantaneous may have caused some teachers to believe that their students were easily distracted. Ubiquitous access to technology in a school environment created a natural tension between the teachers’ understanding of how students should use technology and how students chose to use technology. Yet, student learning in the technology-rich 21st Century requires teachers who can offer innovative pedagogical practices and positive student learning environments that allows for student engagement in the learning process (Reeves, 1998).

Sedgwick High School teachers may have viewed technology as a distraction for maintaining student engagement in the learning process because of their lack of technical skills. They could be fearful or unsure of how to teach in a technology-rich learning environment. Challenges presented by the Digital Age may compete with traditional pedagogical practices. Sedgwick High School teachers face the challenges of integrating the technology into the curriculum, successfully understanding technology, and effectively using technology.

Teachers have not discovered how to reduce the level of distraction without being overly restrictive of students’ use of technology. Teachers viewed the connectedness and entertainment features of technology as distractive. What is viewed as entertaining by a teacher may be simply commonplace for a student. Most Sedgwick High School students were adept at multi-tasking several instant messages while simultaneously completing
their assignments; they did not view their behaviors as disengaging from the learning process.

As the use of one-to-one laptop computer initiatives becomes more widespread with ubiquitous wireless access to the Internet, teachers and administrators must devise policies and practices to address this issue. As schools increase the access to technology, specifically computers and the Internet, teachers will continue to grapple with the challenges and benefits technology offers (Rockman, 2003).

Recommendations for Future Research

This study presents multiple opportunities for future research, including work that focuses on the application of emerging technology and its impact through the perceptions of teachers and students using an appreciative inquiry theoretical research perspective. Moreover, researchers may consider studying the affect of access to technology in high school on high school graduates from a critical theorist point of view. Researchers may seek to understand the perceptions of high school graduates who were involved in a one-to-one laptop computer initiative in comparison to those who were not. Using critical theory, researchers could examine graduates who were advantaged by the use of technology over those who were not. Understanding the perceptions of graduates who had access to emerging technology and those who did not could help to provide additional insight into the advantages that technology presents to the learner.

Although this study did not involve administrators, describing the application of emerging technology and its impact through the perceptions of administrators might offer insights not revealed here. Such a study may describe the impact of technology in the learning environment from the perspective of those in a decision-making position. Future
research may consider the resource issue, implications for policy, and professional development needs for teachers caused by the integration of emerging technology into the classroom environment, as well as inquiry into the negative impact of open-access to the Internet.

This study collected data from a brief period during the middle of the academic year. A year-long study using the research framework of phenomenology of the teachers and students involved in a one-to-one laptop computer initiative may be used to describe the transformation in the pedagogical practices a teacher experiences over the course of an academic year as well as the transformation of the learning environment from a student’s perspective.

Contribution to the Profession

This study will contribute to the field of research associated with one-to-one laptop computer initiatives and related laptop computer learning research. The study was unique because it described and identified, through an appreciative inquiry theoretical research perspective, the perceptions of teachers and students of the impact of one-to-one laptop computer access in a rural Kansas high school. These findings have the potential to contribute to areas of study that focus on the use of technology in schools. Additionally, this study used the LHRHCCM, which provided data that may have not been disclosed through more traditional data-gathering methods. The use of the LHRHCCM may be an important method in accessing the hidden beliefs and attitudes of teachers involved in one-to-one laptop computer initiatives in future studies.

Some educators debate whether they should embrace emerging technologies, specifically one-to-one laptop computer initiatives, and the scope and scale varies widely
(Apple Computer Inc., 2005). Research on teacher and student perceptions of the impact of one-to-one laptop computer access and their ability to embrace the uncertainty that accompanies change has yet to be researched extensively. Findings from this research offered educators new insights into the impact of one-to-one laptop computer initiatives and of technology integration efforts into their pedagogical practices. Additionally, this study offers educators research to guide their decisions in a technology-rich learning environment when deciding to provide a wireless laptop computer for every student in a one-to-one learning environment. Preparation for success in the technology-rich 21st Century requires teachers who can adapt to the integration of emerging technologies into their pedagogical practices. The research will also contribute to the body of knowledge surrounding technology-rich schools that offer a wireless laptop computer for each student and other technologies as they may emerge, as well as aid educators who seek to create a climate of change to prepare teachers and students to embrace new emerging technologies in their classrooms.

Contribution to Practice

Life in the technology-rich 21st Century requires a new literacy, one that relies more on a comprehensive understanding of the world and the skills necessary to live and work successfully in a global society. Technology and the changes associated with its exponential growth influences many facets of the global economy, society, and politics. Understanding the impact of technology on the teaching and learning process through the perceptions of teachers and students will help other educators who may be investigating one-to-one laptop computer access or the application of other emerging technology.
I offer three recommendations for PK-12 administrators and teachers to enhance an optimum technology-rich teaching and learning environment: (1) Staff development practices should focus on identifying and integrating emerging technology that enhances pedagogical practices and student learning, (2) Teacher and student collaboration with other schools engaged in one-to-one laptop computer initiatives should be encouraged, and (3) PK-12 schools should offer annual teacher, parent, and student awareness training that identifies the dangers associated with Internet access.

**Staff Development Practices Should Focus on Identifying and Integrating Emerging Technology that Enhance Pedagogical Practices and Student Learning**

Sedgwick High School teachers and students identified several advantages provided by the application of emerging technology and one-to-one laptop computer access for student success beyond high school graduation. They also described associated challenges to the teaching and learning process. The application of emerging technology into the teaching and learning environment provided a catalyst for change. The change associated with the application of emerging technology and one-to-one laptop computer access proved to be beneficial to the participating teachers and students, as described by their hopes and dreams that they believe technology offers students, in turn creating advantages for them. Access to technology provided students with opportunities to select their own learning style, whether alone or in a group.

Teachers who teach in technology-rich learning environments might benefit from increased training and professional staff development that explains the individual ways in which a student may learn. The understanding of multiple learning styles and the associated student strengths may reinforce the teaching and learning process by
encouraging teachers to visit other schools that provide a technology-rich teaching and learning environment as part of their professional staff development process. Providing teachers with sustained professional staff development that is focused on effective technology integration practices might strengthen their overall pedagogical practices. Additional efforts that are focused on the enculturation of newly hired teachers into a technology-rich environment should also be an integral part of the professional staff development training.

*Teacher and Student Collaboration with Other Schools Engaged in One-to-One Laptop Computer Initiatives Should Be Encouraged*

The teaching and learning process may be strengthened by sustained dialogue among teachers who are actively involved in teaching in one-to-one laptop computer initiatives or who teach in similar technology-rich learning environments. The use of Internet-based collaboration tools such as email, listserves, and online communities may provide dialogue opportunities for teachers in similar teaching environments. Connecting teachers in a global sense to dialogue about the positive core and the challenges associated with a technology-rich learning environment may accelerate the acquisition of pedagogical and technical skills. This idea aligns with Schein’s work (Schein, 1997) on change and reducing the fear and anxiety associated with change. The opportunities associated with collaboration between educators in similar teaching environments may influence the rate of change associated with the application of emerging technology.

Technical and collaborative skills for students could be strengthened through the use of online projects with other students from technology-rich schools. In this technical
and collaborative environment, students from similar schools could create, explore, and
discover technology through increased technology-driven communication.

PK-12 Schools Should Offer Annual Teacher, Parent, and Student Awareness Training

*Identifying the Dangers Associated with Internet Access.*

Teachers, parents, and students need a deeper understanding of the distractions of
technology and the uses of the Internet. Stakeholders, administrators, teachers, students,
and parents in technology-rich schools, may benefit from increased training in Internet
Safety. They need to be versed in appropriate Internet searching techniques to navigate
Internet searches safely. Some students may be naive about the dangers and inappropriate
uses of technology, specifically the Internet. Stakeholders also need to be aware of the
dangers associated with Internet access and the distractions of some Internet websites.
Proactive preventative measures to protect students from accessing inappropriate Web
Sites that are of a pornographic nature or feature gambling and illegal activities or other
unsuitable content need to be developed at a policy level and operationalized. Annual
training to help protect students from Internet child predators may be a first step in
operationalizing proactive policy to protect students. Proactive measures may require
cooperation with local law enforcement or county-wide exploitation agencies. Hopefully,
the research from this study will lead to the development of technology plans and related
policies to create teaching and learning environments that will increase student-learning
opportunities as well as protect students from any associated dangers.

Conclusions

Teachers in the United States are in the midst of a paradigm shift crafted from the
challenges associated with conflict created by the interaction of traditional pedagogy,
instructional practices, and disparity in student academic achievement. They face increased challenges and pressures to promote an emphasis on preparing students for the technology-rich 21st Century. I used an appreciative inquiry theoretical research perspective to describe and identify teacher and student perceptions of the impact of one-to-one laptop computer access on teaching and learning environment. Five of the six findings revealed how the technology changed the traditional teaching and learning dynamics and helped to create a paradigm shift in the teacher and student roles. A sixth finding identified a challenge for teachers and policy makers related to the use and abuse of student access to technology.

These findings identified a positive core among Sedgwick High School teachers and students to describe positive experiences they had through the use of one-to-one laptop computers in the learning environment. Findings from this study may have the potential to contribute to areas of study that focus on the use of technology in schools. This research has the potential to influence school leaders who are seeking to understand the benefits associated with one-to-one laptop computer access by students. Moreover, it shows that teachers and students can work together to make one-to-one laptop computer initiatives successful.
LIST OF REFERENCES
LIST OF REFERENCES


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Appendix A

Protocol and Questions for Teacher Focus Group

Hello! Thank you for being a part of this Focus Group and for your willingness to participate in my study. My name is Rae Niles and I am a doctoral student at Wichita State University. I am conducting research related to the results of the influence of each student possessing a wireless laptop computer on Sedgwick High School teachers and students. Today, I want to hear your thoughts and perceptions about our one-to-one laptop program, specifically the hopes and dreams you have for our students because of the application of emerging technology in our school.

We will be on a first name basis today; however, I will not use your names or other identifying information in my study. Your anonymity will be carefully guarded. All comments you make today will be confidential and your privacy will be protected. In the final version of my dissertation, no one will be able to identify individual responses with the person who contributed them. I am interested in all of your comments today, both positive and the negative. You may withdraw from this Focus Group at anytime and your decision will not reflect negatively on your job, status in the community, or our relationship. With your permission, I will record this focus group in order to focus my attention on our conversation. At the end of the focus group, I will summarize your comments to ensure I understand what you have said. This session will last between 45 minutes and an hour. Are there any questions before we begin?

1. Can you remember a classroom teaching event when you were using technology where it all came together for you and the students? What was happening? What did it feel like? How did the students respond? How did you respond?
2. What makes teaching at Sedgwick High School unique when compared to other high schools? Why is it different?

3. How has your teaching changed as a result of access to emerging technology?

4. Can you describe how using emerging technology has changed how you view teaching?

5. Can you describe how access to emerging technology influenced how you interact with students?

6. If you had the opportunity to talk with parents who were thinking of enrolling their children at Sedgwick High School, what would you tell them about the use of technology?

7. What dreams do you hold for the students you teach as they relate to applying technology to their learning?

Closing

Thank you for your participation in the focus group today. I appreciate your openness and honesty in what you have shared. Would you mind if I contact you at a future date in the event I have questions I need clarified regarding our discussion today? What is the easiest way for me to contact you and when would be a good time?
Appendix B

Protocol and Questions for Student Focus Groups

Hello! Thank you for being a part of this Focus Group and for your willingness to participate in my study. My name is Rae Niles and I am a doctoral student at Wichita State University. I am conducting research related to the results of the influence of each of you possessing a wireless laptop computer on Sedgwick High School teachers and students. Today, I want to hear your thoughts and perceptions about our one-to-one laptop program, specifically the hopes and dreams you have because of the technology in our school.

We will be on a first name basis today; however, I will not use your names or other identifying information in my study. I promise no one will know your name. All comments you make today will be confidential and your privacy will be protected. In the final version of my dissertation, no one will be able to tell who said what. I am interested in all of your comments today, both the positive and the negative. You may withdraw from this Focus Group at anytime and your decision will not affect you, your grades, or our relationship. With your permission, I will record this focus group to focus my attention on our conversation. At the end of the focus group, I will summarize your comments to make sure that I understand what you have said. This session will last between 45 minutes and an hour. Are there any questions before we begin?

1. Can you remember a time when you were using technology in class and it all came together for you and your classmates? What was happening? What did it feel like? How did the teacher respond? How did you respond?

2. How has the way that teachers teach changed because of the use of laptops in the
classroom? Can you share a personal story as an example?

3. Describe a situation where you used your laptop to complete a project. What was the project? What did you learn? How did having a laptop make learning more meaningful?

4. How has the use of your laptop in the classroom influenced the way your teacher interacts with you? Can you illustrate what you mean with an example?

5. How has the access to emerging technology influenced the dreams you have for your future?

Closing

Thank you for your participation in the focus group today. I appreciate your openness and honesty in what you have shared.
Appendix C

Left- and Right-Hand Column Case Method

You have been invited to participate in a research study as part of the Wichita State University Education Leadership Doctoral Program. The study is focusing on teacher and student perceptions of the impact of one-to-one laptop computer access. You will be asked to construct a dialogue in the right-hand column that reflects what might actually occur in a real conversation between you and a teacher from Sedgwick High School about the impact of one-to-one laptop computer access. You will need to finish the conversation in the right-hand column using as many pages as necessary to complete the conversation. Once you have finished constructing the dialogue in the right-hand column, you will read the constructed dialogue and in the left-hand column write down what you thought but did not feel comfortable saying aloud. For example, a new mother tells you the name of her newborn child is “Tweak.” In your conversation, you might say to the new mother, “That’s nice.” In your mind, you might be thinking, “Where did she get that name?”

Left-Hand Column  Right-Hand Column
(What is not expressed aloud)  (What is articulated verbally)
The community is proud of our school. I wish they understood more of the pressures we were under with NCLB. Perhaps the technology will ease the pressures with NCLB.

Joan: We have a great school. Good kids, good teachers, and a supportive community.

Mary: Sedgwick has a strong reputation across the state for the technology.
I’m learning more about using technology. Sometimes letting go of the power in the classroom is hard, but it’s worth it. Sometimes the students know more than I do.

Yes, it looks different, I am excited about the possibilities, but don’t want to brag too much.

______________________.

Joan: The teaching and learning looks different here. We do business differently.
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<thead>
<tr>
<th>Left-Hand Column</th>
<th>Right-Hand Column</th>
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<td>(What is not expressed aloud)</td>
<td>(What is articulated verbally)</td>
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Appendix D

*Data Analysis Matrix I*

Matrix I: Theoretical Frameworks

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<th>Hopes and Dreams</th>
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**Data Analysis Matrix II**

Matrix II: Theoretical Frameworks and Participants

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<th>Change</th>
<th>Hopes and dreams</th>
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<td>Teacher</td>
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<td>10th grade student</td>
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<td>11th grade student</td>
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<tr>
<td>12th grade student</td>
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</table>
Dear Sedgwick High School Faculty Member,

I am a doctoral student at Wichita State University and I am conducting research that specifically focuses on teachers’ and students’ perceptions of the application of emerging technology, specifically the one-to-one laptop computer initiative at Sedgwick High School. My research focuses on teachers of 10th, 11th, and 12th grade students and also the students in those grades.

Fifteen teachers at Sedgwick High School will be asked to participate in an hour-long focus group. The focus group will be conducted at Sedgwick High School.

You were selected to participate in this part of the study because you teach 10th, 11th, or 12th grade students and because of your role in the use of technology at Sedgwick High School. The results of this study may be presented at state or national conferences, reported in educational periodicals or scholarly journals, or used as the foundation material for literary works.

Your participation is strictly voluntary and as such you may withdraw at anytime without fear of it impacting your job, status in the community, or our relationship. You are not required to participate.

All responses will be kept in confidence and your identity will be protected. Your name will not be used anywhere in this study. If you have questions regarding this study, please contact me at home at 316-772-0183 or at school at 316-772-5783. Should you have questions regarding your rights as a participant in this study, you may contact the Office of Research Administration at Wichita State University, Wichita, Kansas, 67260-0007, telephone 316-978-3285.
Your signature indicates you have read and understand your rights as a participant and also indicates your willingness to voluntarily participate in this study. I will keep one copy of this consent form and you may keep a copy for your personal records.

Thank you for your willingness to participate in my study. I really appreciate it.

Sincerely,

Rae Niles

I agree to participate in this study.

Participant’s Signature ___________________________ Date ________________
Appendix F

Sedgwick High Teacher Left- and Right-Hand Column Case Method Letter of Consent

Wichita State University
Department of Educational Leadership

Dear Sedgwick High School Faculty Member,

I am a doctoral student at Wichita State University and I am conducting research that specifically focuses on teachers’ and students’ perceptions of the application of emerging technology, specifically the one-to-one laptop computer initiative at Sedgwick High School. My research focuses on teachers of 10th, 11th, and 12th grade students and also the students in those grades.

Fifteen teachers at Sedgwick High School will be asked to participate in the completion of a Left- and Right-Hand Column Case Method (LHRHCCM) document. The LHRHCCM is a constructed written dialogue in the right-hand column of a folded piece of paper that reflects what might actually occur in a real conversation between you and a teacher from Sedgwick High School about the application of emerging technologies in your classroom. You will be asked to finish the constructed conversation in the right-hand column using as many pages as necessary to complete the conversation. Once you have finished constructing the dialogue in the right-hand column, you will read the constructed dialogue and in the left-hand column write down what you thought but did not feel comfortable saying aloud. The LHRHCCM document can be completed at your convenience at home.

You were selected to participate in this part of the study because you teach 10th, 11th, or 12th grade students and because of your role in the use of technology at Sedgwick High School. The results of this study may be presented at state or national conferences, reported in educational periodicals or scholarly journals, or used as the foundation material for literary works.
Your participation is strictly voluntary and as such you may withdraw at anytime without fear of it impacting your job, status in the community, or our relationship. You are not required to participate.

All responses will be kept in confidence and your identity will be protected. Your name will not be used anywhere in this study. If you have questions regarding this study, please contact me at home at 316-772-0183 or at school at 316-772-5783. Should you have questions regarding your rights as a participant in this study, you may contact the Office of Research Administration at Wichita State University, Wichita, Kansas, 67260-0007, telephone 316-978-3285.

Your signature indicates you have read and understand your rights as a participant and also indicates your willingness to voluntarily participate in this study. I will keep one copy of this consent form and you may keep a copy for your personal records.

Thank you for your willingness to participate in my study. I really appreciate it.

Sincerely,

Rae Niles

I agree to participate in this study.

Participant’s Signature______________________________ Date________________
Appendix G

Sedgwick High School Parent Letter of Consent for Student Participation

Wichita State University

Department of Educational Leadership

Dear Sedgwick High School Parent,

I am a doctoral student at Wichita State University and I am conducting research that specifically focuses on teachers’ and students’ perceptions of the application of emerging technology, specifically the one-to-one laptop computer initiative at Sedgwick High School. My research focuses on teachers of 10th, 11th, and 12th grade students and the students in those grades.

Eighteen Sedgwick High School students will be selected to participate in an hour-long focus group conducted by me at Sedgwick High School. Your child has an opportunity to voluntarily participate in this part of the study because of their role in the use of technology at Sedgwick High School.

All students in grades 10, 11, and 12 were given consent forms to be signed by their parent or guardian and returned to me. From the returned forms 18 students will be selected to participate. The return of this consent form does not automatically assure your child will be selected to participate in the study, but rather that your child may be selected to participate from those consent forms that are returned. The results of this study may be presented at state or national conferences, reported in educational periodicals or scholarly journals, or used as the foundation material for literary works.

Your child’s participation is strictly voluntary and as such he/she may withdraw at anytime without fear of it impacting him/her, his/her grades, or our relationship. Your child is not required to participate.

All responses will be kept in confidence and your child’s identity will be protected. His/her name will not be used anywhere in this study.

If you have questions regarding this study, please contact me at home at 316-772-0183 or at school at 316-772-5783. Should you have questions regarding your rights as a
participant in this study, you may contact the Office of Research Administration at Wichita State University, Wichita, Kansas, 67260-0007, telephone 316-978-3285.

Your signature indicates you have read the information and consent to your child’s participant in this study. Your child’s participation is strictly voluntary.

Please have your child return a copy of this signed form to me in order to be considered for possible participation in this study. I will keep one copy of this consent form and you may keep a copy for your personal records. Thank you for your willingness to participate in my study. I really appreciate it.

Sincerely,

Rae Niles

I give permission for my child to participate in the focus group for this study as described above.

Parent’s Signature ___________________________ Date ________________

Child’s Name ___________________________ Grade Level __________
Assent Form for Students Under 18

I have been informed that my parent(s) have given permission for me to participate, if I so choose, in a study about the influence of the one-to-one laptop computers at Sedgwick High School. My participation is strictly voluntary and I know that I do not have to participate unless I want to. I can stop at anytime and it will not affect my grades, me personally, or my relationship with Mrs. Niles.

Child’s Name__________________________________ Grade Level__________
November 21, 2005

Dear Members of the Wichita State University Institutional Review Board,

At the November 14, 2005 Sedgwick Public Schools, USD 439 monthly Board of Education meeting formal action was taken to grant permission for Rae Niles to conduct a study as part of her requirements in the Wichita State University Educational Leadership Doctoral Program. Board action reflected a 7-0 vote in support of Rae’s proposed study, “A Study of the Application of Emerging Technology: Teacher and Student Perceptions of the Positive Impact of One-to-One Laptop Computer Access.” Members of the BOE and I acknowledge her study involves the collection of data from faculty members and students and will be conducted during December 2005 and January 2006.

We look forward to the results of this study. If there are further questions or if I can be of service, please do not hesitate to contact me.

Sincerely,

Michael D. Hull, Superintendent USD 439
Appendix J

Wichita State University Institutional Review Board Application

APPLICATION FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

Double click gray boxes to enter information.

Name of Principal Investigator(s): Raymond L. Calabrese, Professor for Educational Leadership, Wichita State University, Wichita, KS 67208-0142
(For a student project, Principal Investigator must be a WSU faculty member; student is listed as Co-Investigator.)

Department/Program
Affiliation: Educational Leadership Campus Box: 142 Phone 978-5329

Name(s) of Co-Investigator(s): Rae Niles

Co-Investigator(s) is/are: □ Faculty Member □ Graduate Student □ Undergraduate Student

Type of Project: □ Class Project □ Capstone Project □ Thesis or Dissertation □ Funded Research □ Unfunded Research

If student project, address of student: 4410 S. W. 98th, Sedgwick, KS 67128

Title of Project/Proposal: A Study of the Application of Emerging Technology: Teacher and Student Perceptions of the Positive Impact of One-to-One Laptop Computer Access

Expected Completion Date: April 30, 2006 Funding Agency (if applicable): Not applicable

Please attach additional sheets, if necessary, with numbers of responses corresponding to those listed below.

1. Describe the research in non-technical language:

Sedgwick High School is in the fourth year of a one-to-one laptop computer initiative with students in grades 10, 11, and 12 having access to wireless laptop computers. This dissertation proposes to describe the positive results of emerging technologies based on teachers' and students' perceptions of the teaching and learning environments as a result of their involvement in a technology-rich school environment where students have access to wireless laptop computers. The purpose of the study is to discover and identify teacher and student perceptions of the positive impact of one-to-one laptop computer access. Research will be conducted during December 2005 and January 2006 at Sedgwick High School in Sedgwick, Kansas. A qualitative embedded case study using an appreciative inquiry theoretical research perspective will be utilized.

The research will answer four questions:

1. How do teachers in a technology-rich high school environment describe the positive impact of one-to-one laptop computer access?

2. How do teachers in a technology-rich high school environment describe the positive impact of one-to-one laptop computer access on student learning?

3. How do students in a technology-rich high school environment describe the positive impact of one-to-one laptop computer access?
4. How do students in a technology-rich high school environment describe the positive impact of one-to-one laptop computer access on how their teachers teach?

2. Describe the benefits of the research to the human subjects, if any, and of the benefits to human or scientific knowledge:

Findings from this study have the potential to contribute to areas of study that focus on the use of technology in schools. The convergence of technology, information, and communication are challenges for educators who are faced with preparing students for the Digital Age. Appreciative inquiry allows the researcher to focus on the positive characteristics of an organization and offers a viable resource for addressing the changes necessary to prepare students to successfully live and work in the technology-rich 21st Century.

Findings from this research will offer educators new insights in integrating emerging technologies into their schools or pedagogical practices. Additionally, this study will provide educators with research to guide their decisions in a technology-rich learning environment when deciding to provide a wireless laptop computer for every student in a one-to-one learning environment.

The research will also contribute to the body of knowledge surrounding technology-rich learning schools that offer a wireless laptop computer for each student and other technologies as they may emerge, as well as aid educators who seek to create a climate of change to prepare teachers and students to embrace new emerging technologies in their classrooms. This study is designed to focus on the positive aspects of the one-to-one laptop computer initiative at Sedgwick High School and provide information necessary for understanding the positive impact of the application of emerging technology.
3. Describe the subjects, how the subjects are to be selected, how many are to be used, and indicate explicitly whether any are minors (under age 18 per Kansas law) or otherwise members of "vulnerable" populations, including, but not limited to, pregnant women, prisoners, psychiatric patients, etc.

This study will use a qualitative, embedded case study research design to identify and describe the teacher and student perceptions of the positive impact of one-to-one laptop computer access. Embedded within the context of the study are two units of analysis: 15 teachers and 18 students in grades 10 through 12. Participants in this study will be purposively sampled based on recommendations made by the high school principal and the guidance counselor from the list of current teachers and students in grades 10, 11, and 12. Participants include 15 full-time teachers, and 18 students; six students each from grades ten, eleven, and twelve.

In purposively selecting teacher participants, the following factors will be considered: gender, certification and licensure, and years of service. Factors considered in the purposive sampling of students include gender, socio-economic status, and academic performance. Academic performance will be defined as the grade point average (GPA). Student focus groups will be comprised of three students with a 3.0 GPA or higher on a 4.0 scale and three students with a 2.99 GPA or lower.

I will meet with all students in grades 10, 11, and 12 in their Language Arts classes and explain the study to them. I will provide the students with an assent form and a consent form for their parents. Students who choose to volunteer to participate will be asked to return the assent and consent forms. The participants will be purposively selected from the group of students who return the assent and consent forms and volunteer for participation.

Four focus groups and the left- and right-hand column case method (LHRHCCM) will be conducted with teachers who choose to participate. Separate focus groups will be conducted with six 10th-grade students, six 11th-grade students, six 12th-grade students, and 15 high school teachers. Teachers who do not participate in the focus group will be asked to voluntarily complete the LHRHCCM.

4. Describe each procedure step-by-step, including the frequency, duration, and location of each procedure.

Permission to conduct this study has been secured through formal Board of Education action on November 14, 2005. Minutes of this meeting are attached, as well as a letter of support from Mike Holli, Sedgwick Public Schools, USD 439 superintendent. The focus groups, one with 15 teacher-participants and three focus groups with six student-participants each, will last approximately one hour each and will be conducted at Sedgwick High School. Teacher-participants will be asked to sign consent forms before commencing data collection. Explanation of the LHRHCCM will be provided to participants prior to commencing the completion of the data collection. Confidentiality of all teacher-participants will be protected by the researcher. Any teacher-participant may withdraw from participation at any time. Student participants will be asked to consider volunteering and to discuss any participation with their parents. Sign assent forms and their parents will be asked to sign consent forms prior to the student participating in the focus group. Purposively selected student-participant will be chosen from the pool of students who voluntarily return both forms. Confidentiality of all student-participants will be protected by the researcher. Any student-participant may withdraw from participation at any time or at the request of the student's parent.

5. Describe any risks or discomforts (physical, psychological, or social) and how they will be minimized.

There are no known risks or discomforts (physical, psychological, or social) anticipated for study participants (teachers or students).

6. Describe how the subject’s personal privacy is to be protected and confidentiality of information guaranteed (e.g., disposition of questionnaires, interview notes, recorded audio or videotapes, etc.).

Protocols for data collection will be strictly adhered. The researcher will be the only person able to identify the data collected from participants. Participation in this study is voluntary and as such participants may withdraw at any time without fear of penalty, threat, or duress. All participants will be assured of complete confidentiality and data will be
guarded with complete confidentiality.

7. Describe the informed consent process and attach a copy of all consent and/or assent documents. These documents must be retained for three years beyond completion of the study. Any waiver of written informed consent must be justified.

All teacher participants will sign a consent form indicating their voluntary participation in this study. Student-participants will be asked to discuss participation with their parents before signing an assent form along with their parent's or guardian's consent form indicating their child's voluntary participation in this study. Consent and assent forms will be completed prior to the commencing of data collection or their involvement in this study. The researcher will be the only person with access to the data that is collected.

8. Attach all supporting material, including, but not limited to, questionnaire or survey forms and letters of approval from cooperating institutions.

The Principal Investigator agrees to abide by the federal regulations for the protection of human subjects and to retain consent forms for a minimum of three (3) years beyond the completion of the study. If the data collection or testing of subjects is to be performed by student assistants, the Principal Investigator will assume full responsibility for supervising the students to ensure that human subjects are adequately protected.

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<th>Signature of Co-investigator (for student project)</th>
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