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EVALUATING SIXTH GRADERS' SELF-EFFICACY IN RESPONSE TO THE USE OF EDUCATIONAL TECHNOLOGY

A final project submitted to the Faculty of Claremont Graduate University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

by
Anne V. Castagnaro

Claremont Graduate University
2012

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APPROVAL OF THE REVIEW COMMITTEE

This dissertation has been duly read, reviewed, and critiqued by the Committee listed below, which hereby approves the manuscript of Anne V. Castagnaro as fulfilling the scope and quality requirements for meriting the degree of Doctor of Philosophy.

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Abstract

EVALUATING SIXTH GRADERS' SELF-EFFICACY
IN RESPONSE TO THE USE OF EDUCATIONAL TECHNOLOGY

by
Anne V. Castagnaro

Claremont Graduate University: 2012

Sixth grade is a pivotal time in school, as students culminate their elementary school years and anticipate junior high school. At this age, students become more involved in trends, especially technological trends. When students can utilize the same type of technology inside and outside of school, their self-efficacy may increase. Hypothetically, even within an academic setting, a sixth grader's self-efficacy will subconsciously elevate with these familiar tools. This mixed methods study evaluated the link between the use of educational technology in the sixth grade classroom and students' self-efficacy.

To facilitate data collection for this study, after parental consent was obtained, students completed an online questionnaire via Survey Monkey on their classroom laptops. At a predetermined date, time, and location, teachers of the participating students met with the researcher in focus groups. Before the meeting date and time, the focus group agenda was emailed to the teachers for their perusal. The results of the questionnaire were analyzed using SPSS, specifically examining links between questions pertaining to technology use and questions resulting in high self-efficacy. The results of the focus groups were analyzed for themes within the teachers' comments and served as essential narrative in the results and conclusion sections of the dissertation.

The results of the questionnaire and focus groups produced several implications regarding educational policy and future research. Significant, positive correlations emerged among variables within the established self-efficacy domain and the use of laptops and Smart/Interwrite boards in the classroom, iPods, iPads, and smart phones outside of class, and using educational technology in writing and math during class. No significant differences emerged between boys' and girls' self-efficacy, as corroborated by the teachers' focus group responses. Variables within the self-concept domain emerged as predictors when multiple regression analyses were run with self-efficacy dependent variables. Conclusions that were drawn from this study include the need for educational technology during math instruction, iPads for instruction during class, and further study regarding gender differences in response to technology.

Dedication

This dissertation is dedicated to my grandmother

Edith Chapman Hall (1914-2001)

in memory of her wisdom, joviality, and support of public education.

Thank you for instilling a love of learning within me.

Acknowledgements

In June 2010, I summitted Mt. Kilimanjaro, the “tallest mountain in Africa and the largest free-standing mountain in the world” at 19,340 feet. Without the support of many people I would never have sustained the trek. I constantly compare that experience to completing a dissertation. Similarly, many people supported me in the completion of this dissertation. Though the climb was only a seven-day experience, many parallels exist.

I would like to thank my committee for their encouragement and guidance. Dr. Philip Dreyer was the first professor I had when I entered the Master’s program at CGU in 1999. Through Dr. David Drew’s quantitative methods courses, I discovered that the study of statistics isn’t that scary or intimidating. Dr. Sue Robb’s meticulous suggestions and compliments helped me refine my writing style. Thank you for serving as my guides throughout this journey.

If it weren’t for the CGU Writing Center, I seriously doubt I would be typing these acknowledgements. I spent several years considering different topics and mulling over possible methods until I received an email announcing the next Dissertation Boot Camp in August 2010. From that point on, I faithfully attended the monthly “Boot Camps” and formed a circle of “Dissertators” with whom I met to write and discuss ideas. Namely, the camaraderie and discipline of Becky Hopkins, Jennifer Bourgeois, Shamini Dias, Adriana di Bartolo, and Maja Primorac kept me (relatively) sane and (somewhat) lucid throughout this process.

This project would not have advanced past the proposal stage if it weren’t for the participants. Thank you to Dr. Linda Kaminski for granting access to the

students and teachers of Upland Unified School District. Despite their teaching obligations, the teachers found time in their schedules for their students to complete the questionnaire. In addition, the teachers sacrificed a portion of their weekly collaboration time to meet with me in the focus groups. I am eternally indebted to all of you for your honest responses.

To a Dissertator, “When are you going to finish?” is the most dreaded question anyone could ask. I appreciate the patience and support offered by my family and friends throughout this lengthy and oftentimes harrowing experience. My sixth grade teammates, Julie Moraga and Derek Neri, were especially solicitous in holding our team together when I had to leave early or take days off to write. Noemi Valencia’s Spanish translation of the parent consent form was crucial. Diane Montoya, who pushed me to the summit of Mt. Kilimanjaro, supported me through this process as well. Rachel Underwood and Mandie Fiske were there at the beginning and are still here at the end. Thanks to you and the multitude of others I haven’t named.

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Preface

As an educator with 14 years of teaching experience in the elementary classroom, I have witnessed numerous changes in the profession over the years. By definition, I am not a “digital native,” but I began using computers at school around the time I was in sixth grade. However, I did not have access to computers outside of school until about 1998, the year I received my teaching credential. At that time, educational technology was not a focus in the credential programs.

A few years ago, the city in which I work passed a measure to modernize classrooms with teacher and student laptops, Smart or Interwrite boards, document cameras, and mounted LCD projectors. These changes intimated that teachers would transform their instructional methods and students would experience a new type of learning environment. As I began to incorporate technological components into my lessons, I noticed a change in how students approached assignments. When they were assigned a task that incorporated the use of technology, they seemed more enthused about the activity and eager to accomplish it.

When the time came to solidify the problem for my dissertation, I knew I wanted to investigate this phenomenon. It is exciting to contribute this study to the field of education.

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Chapter 1
Introduction

Statement of the Problem

As our society advances in technology, it is of paramount importance that the educational realm is aligned with the rest of society. In the classroom, implemented technology must be as current as possible in order to prepare our future generations for the workforce (Cuban, 2001). As women assume a greater role in the workforce, it is imperative that we prepare both male and female students for their future (Canada & Brusca, 1992). For example, training students to effectively utilize a presentation aid, such as PowerPoint, can benefit an adolescent's level of self-efficacy while speaking in front of his or her peers.

As a precursor to modern digitized and computerized technology, McLuhan (1964) examined media and its influences on society. Television and radio were the main channels through which the public was exposed to media. Categorizing media into hot and cold delineations, he considers any medium in which so much information is given that one must only slightly infer the meaning "hot" media. If the participant is only given a fraction of the meaning and must greatly infer, the media is considered "cool." Because of its video and audio components, much of educational technology can be considered hot media.

Media and cognition were correlated in the work of Salomon (1979), who asserts, "…different symbol systems represent different kinds of content" (p. 217). Currently, this statement can be related to educational technology and its myriad functions in the classroom. When different types of media are utilized, the students' cognitive functioning is activated in various capacities, with the

result possibly related to the type of media. Thus, different types of media can influence students in various ways.

Numerous external influencing factors can either prepare or inhibit an adolescent as he or she attempts to complete a classroom technological project (Koppich, 2002). These factors include prior experience, comfort level in front of peers, fear of failure, proficiency in the subject area, or nervousness about disappointing the teacher. Even if the majority of these factors are stable, one factor may lurk inside the subconscious, causing an erroneous projection toward the audience (Schunk, 1991). The student's self-efficacy may appear elevated to the observer, but once self-evaluation occurs the outcome expectancy is disproved (Maddux, Sherer, & Rogers, 1982; Schunk, 1989).

Students of the current generation are accustomed to computerized gadgets and the Internet. They cannot imagine life without digital technology (Palfrey & Gasser, 2008). Teachers of these students are diametrically conflicted with this ideology, to a certain point. As older teachers retire and younger teachers enter the classroom, the gap between the teacher as a "digital immigrant" and the student as a "digital native" closes. Typically, if the teacher is a "digital native," he or she is more willing to experiment with educational technology in the classroom. However, that is not to say that the "digital immigrant" is opposed to technological pedagogy.

The "digital divide" describes the inequity among social classes regarding access to and experience with technology (boyd, 2009). Especially by the time they reach sixth grade, students are aware of this inequity. Students constantly

discuss their new phones, new computers, and new video games. Even conversations about Facebook or MySpace imply access to either a computer or smart phone. As boyd (2009) suggests, students relate membership to specific social networking sites to social stratification. Facebook is generally regarded by students as a more mature and refined site, while MySpace is decorative and whimsical. Even though school access to social networking sites is usually restricted and forbidden on campus, the limited experience that is garnered through their use can indirectly prepare students to use educational technology.

If access to technology is limited outside of school, it is obvious when students use technology inside the classroom. Some students are proficient typists, implying prior experience with computers. Other students are unfamiliar with certain functions of the computer, even such rudimentary functions as starting up/shutting down, creating and saving a document, and opening a web browser. However, possession or lack of these skills is not always indicative of access outside the classroom. When teachers introduce students to these skills in the primary grades, by the time they reach sixth grade the skills are ingrained.

In the 21st century classroom, students are expected to utilize technology to modify antiquated learning methods. Currently, the shift toward the paper and pencil-free classroom is still occurring, but predictions indicate an entirely computerized classroom in the near future. For the adolescent, this expectation may be problematic or detrimental to their self-efficacy. Conversely, the expectation may bolster his or her self-efficacy. As more classrooms are becoming equipped with modern technology, the problem is an evolving one.

Bandura (1997) pioneered the field of self-efficacy, relating several of his previously developed and researched theories. Social cognitive theory, observational learning theory, and social learning theory all contribute to the study of self-efficacy in the classroom, especially the sixth grade classroom. In the pre-adolescent stage, all of these theories can be applied to try to comprehend the actions and thoughts of sixth graders. A high level of self-efficacy in learning at this stage can prepare a student for future success in junior high and high school. Not only will a high level of self-efficacy facilitate academic success in these future grades, it will benefit students in social situations.

Several researchers have explored gender differences in response to the use of technology (e.g. Colley, 2003; Hou et al., 2006; Turkle, 1995). The main theme that arose within these studies was the notion of stereotypical gender roles. While using technology, girls preferred task-oriented applications such as email, while boys spent their time playing computer games. Within the classroom, the sixth grade teacher must ensure that time on the computer is spent preparing all students for future technological requirements, allowing computer games as a reward rather than an intention.

It is difficult to identify the causal relationship between self-efficacy and educational technology. Does high self-efficacy occur because of educational technology or were students already efficacious? A self-evaluation or evaluation from a teacher's perspective would determine this answer, since it is not explicit. Even when measured by self-evaluation, student perceptions can be overestimated or underestimated. Corroboration between student and teacher

evaluations can provide a more complete assessment of the student's level of self-efficacy.

Measuring sixth graders' self-efficacy and its link to the use of educational technology is an important endeavor. As more school districts are renovated, transforming into "21st Century" districts, it is necessary to examine the effects of these technological updates. The effects on student achievement have been studied, but without high self-efficacy a student typically will not make achievement gains. The more a student experiences technology in any form outside the classroom, the more he or she may apply those experiences inside the classroom. Even though educators cannot control the level of exposure to technology outside the classroom, they can provide technological experiences for students inside the classroom.

Significance

Students' self-efficacy in the classroom as it relates to educational technology is a significant, contemporary issue. As aforementioned, over the past half century, women have assumed a greater role in the historically male-dominated workforce. Representing one-half of the workforce, women must possess an equitable level of technological self-efficacy if they are expected to compete with men in any line of work (Sanders, 2005). Though college majors such as mathematics, computer programming, and engineering are historically male-dominated, females must possess the confidence in their abilities to succeed in these areas. Classroom teachers have the ability to steer females toward these non-traditional areas of study.

Bandura asserts, “symbolic modeling influences are shaping the attitudes and beliefs of people much more profoundly” (in Evans, 1989, p. 5). This claim can be related to the topic of educational technology and its influence on self-efficacy. Computers, smart phones, and other digital devices are influencing how people communicate, work, learn, and teach, among other daily activities. Corning, Inc. predicted our future reliance on such devices in the revolutionary video “A Day Made of Glass” (Mackie, 2011). In this video, one notices the absence of any type of paper, with absolute reliance on computerized technology. Of course, issues of access and social stratification are implicit as predictions are made about futuristic technology.

Currently, school districts are in the process of implementing the Common Core Standards. These new content standards will dictate the concepts to be taught in the K-12 classroom, just as the previous state content standards did. The Common Core Standards include a “College and Career Ready” component to ensure students’ adequate preparation for higher education and the workforce. Teaching students to problem solve and complete tasks with technology will only benefit them as they advance towards their college and career plans.

During an adolescent’s transition from childhood to adulthood, self-identity development is critical. Changes in biology are accompanied by changes in psychology. Some important decisions must be resolved during this period. Academics become more difficult and career options must be considered. Friends may change, and most importantly, the opposite sex becomes more

attractive. A noticeable gender gap in self-esteem increases as children advance through adolescence and into adulthood (AAUW, 1991).

In 1991, the publication of the national survey *Shortchanging Girls, Shortchanging America* (AAUW, 1991) brought national attention to the issue of self-esteem in pre-adolescent and adolescent girls in the United States. It was found that a sharp drop in self-esteem during the adolescent developmental period is profoundly linked to learning in the classroom. The work of Carol Gilligan (1982), Peggy Orenstein (1994), and the American Association of University Women (AAUW) (1991) highlights the repercussions of ignoring the needs of girls during early adolescence. As our society becomes increasingly more technological, it is the teacher's responsibility to ensure equity in preparation for the workforce within the classroom. Family and school have the greatest impact on a young girl's self-esteem and aspirations (AAUW, 1991).

Social media serves as background knowledge for educational technology experiences in the classroom. If a student is familiar with electronic media and possesses a certain level of comfort with it, one could hypothesize that their level of self-efficacy would be high. Bandura (in Evans, 1989) states, "a theory of psychology should be in step with our social realities" (p. 6). The rapid advancement of our technological realities and abilities may subvert previously established theories of learning. Investigating the fusion of traditional and nascent developments within the educational realm will only benefit future learners.

Bandura's (1986) triadic reciprocal determinism can be applied to this study. The interaction of personal factors, behavior, and environmental influences is perfectly aligned to the examination of self-efficacy in relation to educational technology. This idea is embedded within social cognitive theory. When educational technology serves as an environmental influence, a variety of outcomes may be observed. Depending upon the type of stimuli and the previous level of self-efficacy in the student, their self-efficacy may increase or decrease. Triadic reciprocal determinism's pertinence to this study is also observed in relation to the complexity of the topic. Because both educational technology and self-efficacy are broad constructs, a student may harbor different levels of personal factors, behavior, and environmental influences that coalesce into an individualized representation of the ideas.

Though educational technology is the teacher's focus, students' associations with technology tend to be more social. If the student can associate technology with amusement, the desire to learn and confidence in their performance abilities are both undergirded by this amusement. Generally, students achieve at higher levels when they are in a positive, enjoyable environment. Educational technology promotes this atmosphere and facilitates success for both teacher and student.

Purpose

In order to meet the differentiated needs of the contemporary student, educators must possess an awareness of the most recent advances in technology, both inside and outside the classroom. It is essential that educators

are cognizant of their students' experiences at home to better understand their background knowledge. This study examines the link between what students already know and how it affects their general academic self-efficacy. With the incorporation of educational technology, it is hypothesized that students feel more cognitively connected to the classroom.

With the examination of the link between educational technology and general self-efficacy, educators will be aware of how the changes in their lesson delivery and student practice assignments affect their students cognitively. Though educators are not routinely trained to analyze and interpret psychological damage or growth in their students, it can affect student performance in the classroom. Studying the perspectives of both students and teachers provides a broader view of the current change in instruction and learning, as it is influenced by technological advancements.

Research Questions

The literature review, informal classroom observations over the past few years, and interests of the researcher yielded three research questions on which the research methods were based.

1. To what degree is the use of educational technology linked to sixth graders' high self-efficacy, as indicated by frequency of use?
2. Which factors indicate the greatest difference between girls' and boys' self-efficacy?
3. Which external factors influence elevated self-efficacy, as perceived by the student?

Conceptual Framework

The research questions outlined above were partially based upon a conceptual framework conceived by the researcher. To the best of the researcher's knowledge, there is a dearth of previous research on the exact topic investigated in this dissertation, specifying the topic to the sixth grade age group. The researcher's extensive experience with sixth graders guided the study's narrow age group focus. Educational technology and self-efficacy are both topics that have been examined extensively, but studies that concentrate solely on sixth graders are limited. Many studies focused on college students and even high school students. One reason for the lack of sixth grade studies may be the transitional nature of the age group. In some school districts, sixth grade is included in elementary school, but in other districts sixth graders attend middle school. This study was conducted in a district in which sixth graders attend elementary school.

The implications of housing sixth graders in an elementary school may be observed in the results and conclusion sections of this dissertation. Most of the sixth graders have attended the same type of school for the entirety of their academic career. Because of this familiarity, their level of self-efficacy may be falsely elevated. If the same students attended a junior high school and were posed the same questions about self-efficacy and their abilities, it is possible the results would have been different.

Methods

Both quantitative and qualitative data were collected for this study, providing a mixed methods scope of the problem. The quantitative data were collected in the form of a student questionnaire, administered in the classrooms of cooperating teachers. Several teacher focus groups produced the qualitative data, providing the peripheral perspective of the teachers. Both students and teachers were recruited from a district in which classrooms were recently renovated to incorporate the latest technological devices, classifying it as a "21st Century District." Only sixth grade teachers and their students were invited to participate, as the study focused solely on the academically transitional age of eleven to twelve years.

After approval was obtained from CGU's Institutional Review Board (IRB) and the cooperating school district, principals of the nine elementary schools were contacted. The district has ten elementary schools, but the researcher's own school was omitted due to her familiarity with the sixth grade student population there. The principals were informed of the study and the required time commitment requested of their teachers and students. The sixth grade teachers were contacted and notified the researcher if they were willing to participate in the student questionnaire and teacher focus group.

The participating students completed an online questionnaire via Survey Monkey. The questionnaire enquired about their involvement with technology both inside and outside the classroom (see Appendix A for full questionnaire). It

asked about their general level of self-efficacy, as well as how their self-efficacy was affected by the use of educational technology.

The participating teachers met in several different focus groups, all led by the researcher (see Appendix B for focus group agenda). The teachers were asked several questions which centered around their use of technology in their teaching and its effect on their students, from an observational perspective. The general level of students' self-efficacy was judged by the teachers, in order to obtain a possible corroboration of teacher and student data.

Limitations and Delimitations

Both limitations and delimitations were evident as the study developed. The study concentrated on one district, but because of its designation as a "21st Century District," it satisfied the researcher's requirement. Before the student consent forms were distributed, the students were advised that their involvement in the study would not affect their grades and they were not required to participate. However, some students' participation may have been encouraged by their parents. Care was taken to avoid coercion, but it is impossible to know exactly what the student was thinking at the time of agreement or data collection.

Definitions of Terms

1. Educational Technology: "…the incorporation of Internet and other information technologies into the learning experience" (Whitehead, 2005). Educational technology includes any new technology that is incorporated into the student's learning experience (computers, Internet, LCD

projectors, iPads, etc.). The teacher may or may not use the technology for instruction, but the student definitely uses it for practice.

2. Instructional Technology: "…all tools that are used for teaching and learning such as: cameras, CD players, PDAs, GPS devices, computer-based probes, calculators and electronic tools we have yet to discover" Instructional technology includes any new technology that is used specifically for instruction.
3. Interactive Technology: Any new technology that is used by either the teacher or student in an interactive fashion. For example, an Interwrite or Smart board is not just a presentation tool, but may also be used for demonstration and practice purposes.
4. Self-Efficacy: A psychosocial theory that incorporates and is based upon social cognitive theory, social learning theory, and observational learning. It also envelops self-confidence, but is more related to ability and goal-setting. A high level of self-efficacy means a person has a high level of confidence in his or her ability to succeed. A low level of self-efficacy means a person is not particularly confident in his or her ability to succeed.
5. Social Cognitive Theory: Social cognitive theory is directly related to the cognitive, vicarious, self-regulatory, and self-reflective processes (Bryant & Zillman, 1994). Behavior can be affected by external influences through cognitive processes.

6. Social Learning Theory: Also called observational learning or modeling. Social learning theory is based on the idea of "learning through modeling" and claims "most human behavior is learned observationally" (Bandura, 1977b, p. 22). It also explains how efficacy expectations may or may not affect outcome expectations (Bandura, 1977b).
7. Digital Immigrant: Person who learned to use technology, including computers, email, Internet, and smart phones as an adult. A digital immigrant was born before 1980 (Palfrey & Gasser, 2008).
8. Digital Native: Person who has used technology such as computers, email, Internet, smart phones, and even video games all of his or her life. A digital native was born after 1980 (Palfrey & Gasser, 2008).

Organization of the Dissertation

This dissertation is organized into five main chapters, with references and several appendices included after Chapter Five. Chapter One details the main problem and its significance, providing an introduction to the topic and why it is important to education today. Chapter Two reviews the pertinent literature related to the topic of educational technology and sixth graders' self-efficacy. It is divided into three sections: the history of educational technology, gender differences in response to educational technology, and previous research on self-efficacy. Chapter Three outlines the methods used to collect and analyze the data, discussing the quantitative methods (questionnaire) and the qualitative methods (focus groups). Chapter Four presents the data that resulted from the student questionnaire and the teacher focus groups, including tables to display

the SPSS analysis. Chapter Five offers conclusions drawn from the data, along with implications for further research and educational policy. Finally, the references are listed and the subsequent appendices include the student questionnaire in its entirety, teacher focus group agenda, as well as teacher and parent consent forms and the student assent form.

Chapter 2
Review of the Literature

Conceptual Framework

The conceptual framework of this dissertation was developed based on three main themes: educational technology, gender differences in technology, and self-efficacy. These three themes were examined separately in this literature review to frame the research questions. In addition, the themes are broad topics, each with an individual wealth of research. Whenever the topics were merged within a journal article or other resource, the citation was included in the section to which it pertained most clearly.

Purpose

The purpose of this literature review is to clearly delineate the three aforementioned themes. Because educational technology, gender differences in technology, and self-efficacy have been so frequently examined individually, it was necessary to provide a separate background and description of each topic. It was difficult to locate studies in which all three topics were fused, but this discovery was included whenever it was encountered.

Providing a historical background of educational technology gives a foundation on which to examine the recently completed studies. Since computerized and digitized educational technologies are relatively recent fields of examination, the brief chronological overview provides the empirical evolutionary evidence. One of the research questions focuses on the differences between males and females in the sixth grade classroom. It was necessary to examine the recent published studies related to gender differences in technology use, as

well as differences in self-efficacy. The theories that provide the basis for the theory of self-efficacy are briefly mentioned to introduce self-efficacy. Finally, any studies that coalesced the three main topics in this study were reviewed.

The Evolution of Educational Technology

"American education is obsolete," claimed Margaret Mead in 1972 (Cassidy, 1982, p. 72). It is the school's responsibility to prepare students for the workforce. Therefore, if schools maintain antiquated methods of instruction, practice, and mastery, contemporary education will advance no further than it had in 1972. In the case of technology, students are usually more knowledgeable than the teachers utilizing it. Computerized technology can function as a motivator for student success. Individual student needs can be met through the limitless possibilities of educational technology (Glennan & Melmed, 1996).

Technology throughout history. Technology is a term that has been considered in several different contexts throughout the ages, "conceived by the ancient Greeks as a particular activity and as a kind of knowledge" (Saettler, 1990, p. 3). It has not always referred to the use of computers, the context in which we presently interpret the term. Technology can refer to any tool that relieves the user of strife in a certain situation. Rewinding back to the time of the early humans, technology would refer to the spear. The spear was essential for hunting and fishing, but a neighboring tribe could very easily develop a new piece of technology without communicating their ideas to anyone else. Because of our advanced methods of communication today, this type of technological isolation

does not exist. Some people may receive the information faster than others, but eventually everyone is informed of the news. (Porter, 2007)

Cave paintings from the Cro-Magnon era of early humankind symbolize a primitive need and desire for communication (Hogben, 1949; Saettler, 1990). Though the technology was vastly different, many enforced skills were identical to the skills taught in schools and homes today. The oral tradition flourished, despite the invention of a simple alphabet. Obviously, listening skills were essential to the learner's success, even from the dawn of humankind.

In the era of ancient Mesopotamia, the stylus was invented to communicate ideas through writing on clay tablets. Up until this time, there was no record of daily activities, and archaeologists and historians have had to surmise through the discovery of artifacts. The cuneiform system of writing used a variety of lines and triangles to communicate ideas in a universal way. The novelty of the clay tablets may have encouraged unnecessary documentation of daily routines. Conversely, the tedium of documentation in this style may have also dissuaded people from writing. (Porter, 2007)

The ancient Chinese invented the printing press, affording students an efficient method of communication (Palfrey & Gasser, 2008). Historians were pleased at this discovery, as official records of ancient civilizations were finally available. Still, only the privileged and educated members of this society were able to contribute to these historical documents. Though the prevalent technology had advanced, access to it was limited to a specific class. (Porter, 2007)

Advent of educational technology. During the early 20th century, instructional technology appeared in the form of television, film, and radio. These predecessors to the computer served distinct purposes, as opposed to the computer's ability to synthesize all three types of media. Though many contemporary educators are unfamiliar with the educational features of television, film, and radio, it is possible to envision a purpose for them in the classroom. Educational films were first developed as theatrical entertainment, but soon developed into an instructional medium (Saettler, 1990). Originating as newsreels and travelogues, educational films soon expanded into additional topics. Surprisingly, Thomas Edison pioneered classroom films that taught specific areas of history and science. *The Minute Men*, released in 1911, chronicled part of the American Revolution. Edison's science series, released in 1914, focused on natural and physical science with *Cabbage Butterfly*, *Cecropia Moth*, *Life History of the Silkworm*, *Magnetism*, and *Microscopic Pond Life* (p. 96).

Educational radio broadcasts began in the mid-1920s (Saettler, 1990). Radio education courses were offered at colleges and universities, and the U.S. Office of Education invested an interest by forming a radio section. Radio education did not endure as television and film did, as interest subsided by the late 1930s. The Ohio School of the Air offered a weekly schedule of radio education.

- Monday: Story plays and rhythmics and health talks, alternating; current events; history dramalogs;
- Tuesday: Special features, questions and answer periods; art appreciation; civil government, by those who govern;
- Wednesday: Stories for younger pupils; stories for intermediate grades; stories for upper grades;
- Thursday: Dramatization of literature for high schools; geography;
- Friday: No program in deference to the Damrosch lessons in music (Saettler, 1990, p. 199)

The visual instruction movement advanced learning and provided teachers with augmentations to their lessons. The “Cone of Experience” demonstrates how direct instruction can be the base for a scaffold of learning. Teachers provide the concrete lesson through direct instruction, then the student is guided through more abstract experiences. Edgar Dale developed this “Cone of Experience,” explaining “learners could make valuable use of more abstract instructional activities drawing on reservoirs of their more concrete experiences” (Saettler, 1990, p. 143).

Television became a relevant instructional strategy with the advent of both open and closed circuit television programs. Lessons that were broadcast on television were more novel to children, probably due to the recent introduction of television as a mainstream media device. Children’s programs on the Public Broadcasting Station (PBS) provided teachers with an alternative to direct instruction. Frequently, shows were scheduled for broadcast during the school

day, coinciding with lesson time. Teachers used the television program to supplement, or sometimes replace, their instruction.

Personal computers. The computer appeared in the classroom in the 1980s. The personal computer was not yet at the height of popularity. Though it was rare to own a personal computer, the computer was becoming more of a fixture in the classroom. In reference to the aforementioned definition of technology, the computer did not yet hold a necessary, practical function in everyday life. Some tasks were alleviated with the aid of a computer, but it was not as prevalent or necessary. Enhancing educational outcomes was an early goal of Apple Computers, as the company attempted to appeal to educators (Amiel & Reeves, 2008; Saettler, 1990).

In 1982, Time magazine named the IBM PC its “Man of the Year” (Chapman, 2000; Hall, 2009). The evolution of the personal computer was upon us. During this same decade, the Internet began to grow. From its infancy as a text-based system used primarily by the government, it developed into the World Wide Web, enhanced by colorful graphics and features (Chapman, 2000). With its wealth of information, a virtual electronic library, the Internet began to appeal to both college students and professors as an educational tool during the 1990s. This educational tool evolved into an actual instructional tool, which facilitated the completion of courses and even degrees through online learning, popularized at the beginning of the 21st century.

The computer to student ratio steadily increased as computers gradually assumed many menial daily tasks. In 1983, the computer to student ratio was

estimated to be one computer per every 125 students. In 1995, that same ratio was one computer per every nine students (Glennan & Melmed, 1996). Presently, in 2011, a growing number of classrooms are equipped with one computer per every two students. School districts' budget allocations vary and many cities have passed bonds to provide the funds for technology. Even if a specific school is not yet equipped with a one to two ratio, it is probable that the school has a computer lab, where students may visit individually, in groups, or as a whole class.

Integrating technology. Incorporating technology into teaching can increase the effectiveness of the lesson (Glennan & Melmed, 1996). Either the students pay closer attention because of the employed technology or the technology motivates the students to learn. Many teachers consider the use of technology as an essential teaching tool, while others utilize a combination of traditional and contemporary methods. However, teachers must remember that true implementation of technology does not merely refer to using Microsoft Word to type an essay. Unless teachers are introducing and implementing activities that can only be executed on a computer, students can create the same product by using a typewriter (Cuban, 2001).

Cuban (2001) discusses a teacher who has achieved success through the implementation of technology into her regular social studies curriculum. To demonstrate knowledge of a certain historical event, the teacher's students must not only create a written product but also integrate a technological visual to complement their project. The teacher's motto is "conceptualize and actualize"

(p. 69). She expounds, “I could teach what I want without computers, but not with the outcomes I want.” (p. 70). This teacher is a prime example of the instructional shift from authority-based to discovery-based learning (Ben-David Kolikant, 2009; Brown, 2002). Students possess no qualms about trying new strategies and simply accepting the outcome if it is successful. Ben-David Kolikant (2009) refers to this type of learning as “bricoleur style”, meaning “an extreme demonstration of which is that when something ‘works,’ no further justification is required” (p. 132).

The implementation of computer technology can affect students’ learning preferences in the classroom (Ben-David Kolikant, 2009). It is important to understand how students view the relationship among the constructs of school, learning, and digital technology. Because contemporary students’ exposure to digital technology is so vast, they are beginning to associate the three constructs. As recently as one to two generations ago, a minimal to nonexistent relationship could be observed. Descriptors of the current generation of learners include: Clickerati, the three Xs generation, digitally fluent, and Net generation (Ben-David Kolikant, 2009).

With the implementation of technology, equity can be a controversial issue. Which schools receive new technology? Is it fair to only expose the lower socioeconomic status (SES) schools to innovations in technology because it is probable that they don’t have access at home? Lower SES schools are more likely to receive the funds necessary to purchase new technology, but then higher SES schools are left out. Consequently, even though students from a

higher SES background will probably have computers in their homes, without technology as an aid to learning in the classroom their education will suffer.

School districts must be creative with meeting the costs of implementing new technology. Sometimes sites can make careful budget decisions to allow for purchases. Oftentimes, a city bond is passed in which the residents agree to a nominal increase in property taxes to provide funds for school site modernization. Once the funds have been allocated or garnered, the process of renovation begins. From there, teachers are inconvenienced with the task of packing up their classrooms and adjusting to their new environment, simulating a blank slate of ideas and possibilities. This prospect energizes some teachers, while it terrifies others.

School sites are faced with challenges that accompany the implementation of technology. Some of the aforementioned aspects such as effectiveness, equity, and costs can be challenging. Principals can be faced with the challenge of persuading their teachers to use technology as a teaching tool. Some teachers may be uncomfortable with the implementation of certain tools, while others will be eager to explore the arena. In 2001, 80% of schools with Internet access provided their teachers with professional development, focusing on integrating technology into the classroom structure (Hall, 2009).

Though they were devised in 2000, Chapman's (2000) recommendations for implementing and utilizing technology in the classroom still resonate today. He recommends to "close the digital divide" (p. 351) by providing affordable access to the Internet, especially in poor and low-performing schools. Developed

in 1997, the Technology Literacy Challenge Fund is just one program created to target these schools, and a $75 million grant program entitled Preparing Tomorrow's Teachers to Use Technology was integrated into teacher credentialing and training courses in 1999 (Chapman) to ensure that teachers are adequately prepared to teach with technology. As current research is conducted and market demands are identified, software companies must meet the needs of schools, basing their content on state standards. The education community must invest in research and development to ensure that schools are not excluded from the inception point. Finally, Chapman suggests funding evaluation. Determining a student's success, or lack thereof, should be a process that includes both traditional measures as well as contemporary technological tools. Teacher evaluations can also benefit from these new tools, creating self or administrator-performed assessments. These suggestions must be revisited in order to prepare our students adequately.

Capacities for use. Educational technology can refer to the use of computers and other media in several different capacities. As technology advances and technical engineers realize what works and what doesn't in the educational setting, different devices will become available for educators to utilize. These devices include:

- support for individual learning activities – word processing and spreadsheets, drill and practice on specific skills, Internet-accessed resources, communication with experts, simulations that help visualize mathematical or scientific concepts;

- support for group learning activities – email for group communication, presentation software for group collaboration, video presentation, data collection and analysis among schools;
- support for instructional management – integration of curriculum, standards, and assessments, management of student portfolios and exhibitions, development of individual instructional plans or contracts;
- communications – communication between different learning environments, communication among teachers, parents, and students; and
- administrative functions – support for attendance, accountability functions, and other administrative activities (Glennan & Melmed, 1996, p. 4).

Access to educational technology. Chapman (2000) wrote in his research for the Brookings Institution that the number of computers available in schools determined students' access to the Internet. Since high school students were fortunate enough to have large computer labs and a greater quantity of computers in their schools than elementary students, their access was rated higher. In the late 1990s, many schools still used Apple II models, which were not Internet-compatible. Thus, in order to provide the access for their students, schools were forced to invest in more recent computer models. The financial burden then became a relevant consideration.

Gray, Thomas, and Lewis (2010) have found that one-hundred percent of all schools in the United States currently have access to the Internet. The

operative word in the previous sentence is “schools.” Though students may have access to the Internet at school, access at home can prove problematic. Depending upon the situation of their own students, teachers may or may not elect to assign homework that is Internet-based. Many teachers also post grades and assignments online, but this communication is irrelevant if access is limited or restricted. This inequity is creating a “digital divide” within societies that demand the use of technology (Palfrey & Gasser, 2008; Shana, 2009).

Even though the United States has equipped its schools with Internet access, the same cannot be said for other countries. The “digital divide” not only spans societies within countries, but it also spans borders (Palfrey & Gasser, 2008). Funds are an impediment within specific schools and specific districts, but to equip the world with a technological advantage would be an exorbitant undertaking.

Some universities have even experimented with offering students a personal laptop for school use. Demb, Erickson, and Hawkins-Wilding (2004) found that the provided laptop affected the study habits and academic and social lives of about two-thirds of their survey respondents. In the small liberal arts institution where they conducted their research, Demb et al. (2004) encountered a wide variety of reactions to the laptop initiative, demonstrating the fact that teachers may feel resistance toward incorporating technology into their instructional methods. One student said, “None of the four classes that I’ve been in have used it as a requirement,” while another commented, “It was all related to the class and it really got people thinking about what we were studying.” (pp.

385-386). Out of the 73 student participants in the survey, 89% of the students strongly or somewhat agreed, “Microsoft Word is very useful for doing papers for class.” (p. 391). Also of significance is the 77% strong or somewhat strong agreement that “PowerPoint is a very useful tool for doing class presentations.” (p. 391). However, 52% of the respondents strongly or somewhat agreed, “My professors do not incorporate laptops effectively into class.” (p. 391). Arguably, this data was collected in 2002, and attitudes toward technology have altered dramatically. The observation of this change over a period of less than ten years demonstrates the extremely rapid shift in our consideration of educational technology.

Digital natives versus digital immigrants. Students born between 1980 and 1994 are referred to as “digital natives” or the “net generation” (Ben-David Kolikant, 2009; Bennett, Maton, & Kervon, 2008; Palfrey & Gasser, 2008). These students have never known a world without the Internet, computers, mobile phones, and other handheld devices that have become so commonplace in our lives today. Students are raised utilizing these devices in their everyday lives and find it odd that they are not so prevalent in the classroom. They can be described as “active experiential learners, proficient in multitasking, and dependent on communications technologies for accessing information and for interacting with others” (Bennett, Maton, & Kervon, p. 776). These qualities, as they relate to traditional teaching, can create a disconnect between the contemporary student and the teacher. Digital immigrants encompass much of the current population of teachers, who were raised without the advances of

modern technology, both inside and outside the classroom.

The present educational system was not designed to teach today's students (Shana, 2009). Traditional models of education "can help students achieve only a fraction of the quality education they need in an informational age" (p. 215). If we continue to teach the traditional methods in teacher education programs, we will prepare students for a future that has become our past. Student learning has advanced beyond "a model of an empty pot to be filled with knowledge" (Martin, 2003, p. 5) to a behaviorist viewpoint with "the learner as an enthusiastic rat to be rewarded for displaying remembered behaviour or knowledge" (p. 5) to finally a constructivist viewpoint. Employing the constructivist viewpoint of the student's creation of a plan and navigating his or her own way through it best describes our current educational situation. When the student can utilize technology to his or her personal and educational benefit, a different type of learning occurs.

The possibility exists that the novelty of incorporating interactive whiteboards and student laptops is the impetus for student engagement in the classroom. Unfortunately, this quandary will remain unanswered, as technology is constantly within an evolutionary cycle. It has been stated that the truly artful teacher need not rely upon a gimmick to engage students in learning, which will always remain valid. However, schools continuously battle home environment, most of which are saturated with technological gimmicks.

Instructional technology eventually evolved into interactive technology. It has been said that the maximum amount of retention occurs when a topic is taught by the learner, not merely absorbed. During the 1990s, the creation of

technology lessons began to focus on student use of technology, rather than teacher demonstration. Professional development for teachers in the area of technology-based lessons became popular. Many higher education institutions began to offer Master's programs in educational technology ("ed tech"). Textbook publishers incorporated technology components to appeal to futurists. Many states, including California, even adopted technology standards, separate from content standards. Teachers were expected to revise lessons to not only teach the state content standards, but also infuse the technology standards into their lessons.

Shifting the focus from a teacher-centered environment to a student-centered environment is challenging for many educators. However, the school's obligation is to prepare students for the future. Experience with various methods of learning technology will equip students for higher education expectations and future occupations. Resistance from teachers and administrators who feel technology detracts from standardized testing success is evident in many schools. These educators may already possess the tools necessary for success and may doubt the necessity of an additional and expensive resource, thus shunning the implementation of technology.

Shifting our pedagogical focus. The future of technology in the classroom will depend upon the evolution and creation of devices and applications that reach students at their level. Methodology and outlook will shape the differences between current and future devices (Saettler, 1990). As technology evolves outside the classroom, it will be imperative to implement

interactive teaching and learning devices to prepare students for the real world. Aligning the student's needs with the needs of the future employee can help guarantee success for upcoming generations. To achieve this pedagogical shift, current goals and practices must be examined and reformed (Ben-David Kolikant, 2009).

Gender Differences in Response to Technology

Much research has been conducted regarding gender differences in the classroom. With the continuous incorporation of technology and technological learning aids, a contemporary issue has arisen. In what ways do boys and girls respond to technology in the classroom? What are the differences and effects? Several studies have been completed in the U.S. and internationally (AAUW Educational Foundation Commission on Technology, Gender, and Teacher Education, 2000; Barbieri & Light, 1992), as these technological advances in education are a global phenomenon.

Most children are familiarized with computer usage through the use of the Internet. This usage implies that they have access to a computer either at home, at a friend or relative's house, at the public library, or at an Internet café. Oftentimes, parents rely on Internet games to hold their children's attention for extended periods of time. In the early elementary grades, teachers will employ various websites to reinforce concepts such as basic math facts. Once the student has reached the end of their elementary school experience, they will have had significant exposure to and application of Internet usage.

Word processing can be another useful tool employed by teachers and parents. Since preparing typed documents on the computer is a lifelong skill, the earlier students master this practice, the better. Once students are familiar with simply typing a document, more advanced features such as inserting clip art, pictures, graphs, and tables may be taught.

Depending upon the skill and comfort levels of the teacher, students may begin to create PowerPoint presentations during mid to late elementary school. At the middle and high school levels, the expectation is that students will have the skills to create and present a PowerPoint project, unassisted. Usually at the elementary level, students work with a partner to create their project on a regular basis. Presentation software can be used in any subject area to demonstrate mastery of a topic or standard. Since they have created the project, they are usually eager and proud to present it to the class.

Gender differences within each of the aforementioned computer applications (games, word processing, and PowerPoint) exist. Girls and boys will choose different types of games to play on the computer. Boys are more inclined to play games, but as long as the game has an appealing aspect to it, girls will play as well. Within a word processing document, differences are evident in the type of font used. Most girls are attracted to a flourishing or bubbly script, while boys prefer a block or miniscule font. While creating a project on PowerPoint, students have numerous opportunities to display their preferences or originality, if it is allowed within the teacher's rubric. Typically, girls will choose or create a more intricate background related to their slide topic. Boys tend to present the

required information, but deviate from the topic while garnishing their slide. Of course, exceptions always exist.

Lin and Yu (2008) explored the gender differences within adolescent Internet usage. As the Internet rose to prominence in the 1990s, a gender gap was evident. Boys and girls were using the Internet for completely different reasons. However, their study discovered no apparent differences between boys' and girls' Internet usage motives.

Home computer use can carry over into the classroom (Veriki and Chronaki, 2008). When a student enters elementary school, whether or not they have access to and experience with a computer is evident. Veriki (2010) claims that boys have more positive information and communication technology (ICT) value beliefs and self-efficacy than girls.

Adolescent boys and girls will discover that the aforementioned gender differences in response to technology will most likely follow them into their future workplace. Venkatesh, Morris, and Ackerman (2000) studied how men's and women's attitudes toward technology can affect their daily decision making processes at work.

Studies have shown that girls approach computers as a means of accomplishing tasks, while boys use them for play and mastery (Colley, 2003). Hou et al. (2006) arrived at this same conclusion while exploring gender differences in information and communication technology (ICT) use among U.S. middle school students. In their study, participants were asked to video record their use of technology as well as their friends' everyday usage. The researchers

requested that the video clips be split into five clips, totaling one to two hours. Most notably, while using the video cameras, boys were more interested in exploring the advanced features of the video camera and girls were satisfied with the zoom function. Boys included visual special effects on their submitted tapes. When girls attempted to engage the "digital effects" button and nothing happened, they did not pursue it further. Both boys and girls were pleased with the final product they had created.

This naturalistic observation provided Hou et al. (2006) with an unbiased glimpse of the students' attitudes towards technology. Though the participants were not particularly technologically savvy, they indicated that most pre-adolescents of their age group enjoyed "computers (especially instant messaging, downloading music, games, and word processing), iPods, cell phones, picture and video cameras, and game systems" (p. 877). Boys preferred the focus on entertainment and fun, while girls favored communication through technology.

In the classroom setting, Colley (2003) investigated the preferences of the computer use of boys and girls. Colley's findings are similar to those of Hou et al. (2006) in that the girls preferred associating computers with work and email, while boys preferred playing computer games. "These gender differences are a further demonstration that girls approach computers as tools for accomplishing tasks, while boys approach them as technology for play and mastery." (p. 673). Possibly because of this association between computers and fun, boys are much more experienced with computers at home, providing a familiarity in using

computer hardware and software (p. 673). In boys, positive computer attitudes abound and they are more confident in their computer use than girls (Brosnan, 1998; Comber et al., 1997; Todman & Dick, 1993).

Traditional gender role socialization is inherent in the attitudes of boys and girls towards computers. Turkle (1984) categorizes the boys as "hard masters" and the girls as "soft masters." Hard masters prefer analytical rigor, while soft masters are attracted to exploration and creativity. Therefore, soft masters would naturally magnetize toward the Internet (Turkle, 1995). As the Internet's value as a learning resource increases, these characteristics may prove problematic for the hard masters (Colley, 2003). "Even with equal encouragement and access, there may be differences in the way in which girls and boys perceive and use computers at school, which help sustain a gender gap." (p. 675).

Selwyn (2001) recognized the differences among students' reactions to educational computing. He devised themes to organize both positive and negative differences. One theme discusses the speed and ease of the computer. Some students felt the computer hastened their work, and others felt the computer was more burdensome.

Despite students' responses to technology, teachers can aid in the facilitation of equitable access by employing critical pedagogy. During instruction that uses this method, teachers are consciously aware of gender, race, and class differences and strive to eradicate them. Issues of dominance and power also hold prominence. Both the curriculum content and the classroom management system are infused with these ideas (Baldwin, 2006). The students' experiences

can be linked to the curriculum and literature, and knowledge becomes more "relevant and introspective" (p. 10). If the classroom teacher effectuates these concepts during instruction, the difference in the gender gap will eventually minimize.

Previous Research on Self-Efficacy

Self-efficacy developed through the synthesis of several psychosocial concepts. Led by Albert Bandura, self-efficacy is a relatively recent theory, based upon more established theories. Social cognitive theory, observational learning, and social learning theory were all previous Bandura concepts. Descriptions of these previous concepts are followed by an explanation of self-efficacy, culminating in a synthesis of self-efficacy and educational technology, which directly pertains to the investigative issue.

Social cognitive theory. Social cognitive theory is directly related to the cognitive, vicarious, self-regulatory, and self-reflective processes (Bryant & Zillman, 1994). Behavior can be affected by external influences through cognitive processes. Triadic reciprocal causation (Bandura, 1997; Bryant & Zillmann, 1994) is represented in a triangular fashion, with B representing behavior, P representing the events that can affect perceptions and actions, and E representing the external environment. The ideas are reciprocal and reflect one another, flowing back and forth. This idea is also referred to as "triadic reciprocal determinism."

Bandura continues to state, "Cognitive factors partly determine which environmental events will be observed, what meaning will be conferred on them,

whether they leave any lasting effects, what emotional impact and emotional power they have, and how the information they convey will be organized for future use." (Bryant & Zillmann, 1994, p. 62). People symbolize their experiences to give them meaning, form, and continuity. When information or experiences are symbolized, people can expand their knowledge and understanding.

People tend to evaluate their own behavior based upon internal standards (Bryant & Zillmann, 1994). Adolescents are in the process of developing this disciplined approach of behavior evaluation. Bandura (1986) refers to this evaluation as "self-regulatory capability." However, if adolescents do not apply the learned self-regulatory skills, their attainment becomes ineffective (Bandura, 1993). Bandura developed a scale to assess self-efficacy in relation to self-regulated learning (Rule & Griesemer, 1996), thus linking these self-regulatory skills to the concept of self-efficacy.

Social learning theory. Social learning theory explains how efficacy expectations may or may not affect outcome expectations. Teachers may hold certain efficacy expectations for their students, usually that the student has the potential to complete the task. Conversely, the student may not possess the same level of efficacy. Due to past experiences, lack of preparation, or possible unknown variables, the student's level of efficacy can greatly shape both their outcome expectations and the actual outcome of the task. Teachers may personally predict the outcome of the task, but students are ultimately responsible for it. Certainly, the possibility exists that a student will surprise

himself or herself with an outcome that was unexpected. Students must have a strong conviction in their own effectiveness to even attempt a new or unfamiliar task (Bandura, 1977b, p. 79).

Albert Bandura's theory of observational learning can be applied to this study. Adolescents observe their classmates as they give presentations, attempt to challenge themselves with new endeavors, and experience failure. Much of an adolescent's confidence to accept new and unfamiliar challenges lies within him or her, but can also be greatly influenced by the actions of peers. The component processes that govern observational learning in the social learning analysis are detailed within the following categories:

- Attentional Processes: Modeling stimuli are characterized by distinctiveness, affective valence, complexity, prevalence, functional value. Observer characteristics consist of sensory capacities, arousal level, perceptual set, past reinforcement;
- Retention Processes: Symbolic coding, cognitive organization, symbolic rehearsal, and motor rehearsal;
- Motor Reproduction Processes: Physical capabilities, availability of component responses, self observation of reproductions, and accuracy feedback;
- Motivational Processes: External reinforcement, vicarious reinforcement, self-reinforcement (Bandura, 1977b, p. 23)

During observational learning, the modeled events will advance through each process sequentially. First, the event will capture the observer's attention

through certain stimuli. Second, the event will undergo a process for retention. Third, the observer will reproduce the event, utilizing motor skills. Finally, a process of motivation must occur in order for the event to become attractive to the observer. After the processes are complete, the observer will have the capacity to replicate the performance.

Self-efficacy. Bandura's previously developed concepts led to the construct of self-efficacy. A high level of self-efficacy can be fostered in four distinct ways (Bandura, 1986).

Physiological state. Barriers to high self-efficacy can materialize if physiological conditions are not conducive to positive growth. If a person is nervous, tired, agitated, or experiencing pain, he or she will not project the highest level of confidence (Bandura, 1986). The physiological state can perpetuate a successful outcome.

Enactive attainment. Mastery experiences provide the learner with proof that the goal can be met. Bandura (1986) asserts, "successes raise efficacy appraisals; repeated failures lower them, especially if the failures occur early in the course of events and do not reflect lack of effort or adverse external circumstances" (p. 399). If the experience is a failure and is due to lack of effort rather than lack of ability, the learner will not be discouraged from attempting the activity again in the future.

Vicarious experience. When students observe their peers achieve success in certain areas, it bolsters their own confidence in their abilities. Sometimes this vicarious, implicit encouragement is all a student needs to

achieve a certain goal. Students with a high level of self-efficacy are able to raise that level even higher due to the observation of these models (Bandura, 1986).

Verbal persuasion. To heighten the level of self-efficacy by verbal persuasion alone is rare, but this encouragement can contribute to success (Bandura, 1986). Conversely, if a learner is verbally discouraged from attempting a new experience, he or she will be more apt to avoid it. Learners must possess some level of elevated self-efficacy in order to try a new situation. Most likely, the teacher will offer a student reassurance and encouragement through verbal persuasion. Statements like "You can do it." and "You're doing so well." can have a profound effect on a student's self-efficacy. By simply hearing that someone believes in him or her, the student's level of confidence may change. The teacher's own self-efficacy is linked to the dissemination of verbal persuasive comments. If a teacher is highly self-efficacious in his or her own teaching and the ability to influence a student, the more he or she will offer verbal comments.

Evans (1989) provides further proof for the success of verbal persuasion by offering, "People engage in activities that they believe they can master" (p. 53). Hong, Chiu, and Dweck (in Kernis, 1995) suggest confidence plays two different roles when related to academic achievement. Performance outcomes that were previously or currently achieved can be represented by confidence. Additionally, future outcomes may be influenced by the level of confidence.

Salomon (1984) claims if the task is easier, students will not put forth as much effort. "Because students perceived TV to be an easy medium to learn from and felt efficacious about doing so, they expended less effort and achieved at a lower level than when exposed to written text." (Schunk, 1989). One can deduce that students put forth more effort if the task is more difficult.

Perceived self-efficacy. Human agency refers to the capability people have to control their own actions and lives (Bandura, 1993). Cognitive, motivational, affective, and selection processes exist within these actions. Motivation can be a contributing factor to elevated perceived self-efficacy. Bandura (1995) defines perceived self-efficacy as "…beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations" (p. 2).

Academic effects depend upon "students', teachers', and staff's collective efficacy." (Bandura, 1993). However, these results ultimately stem from the efficacy of the principal, who leads and inspires the staff. Strategies include "verbal modeling of cognitive strategies, proximal goal setting, ability and effort attributional feedback, positive incentives, and self-verbalization of task strategies." (p. 135). Further supporting these positive strategies, he states, "It is difficult for children to remain prosocially oriented and retain their emotional well-being in the face of repeated scholastic failures and snubbing by peers that erode their sense of intellectual efficacy." Even though children may have developed in a similar cognitive way, their perceived self-efficacy can affect their academic outcomes either positively or negatively.

The level of teacher self-efficacy can affect the level of his or her students. “Students who end up being taught by teachers with a low sense of efficacy suffer losses in perceived self-efficacy and performance expectations in the transition from elementary school to junior high school” (Bandura, 1993, p. 142). If a teacher does not possess a high level of efficacy in his or her own ability to teach students, the effect on the students will be noticeable.

Self-efficacy in girls. Instilling confidence in young girls has been examined and encouraged in recent years. Researchers have realized that because of teachers’ and parents’ proclivity toward perpetuating standard gender roles, young girls’ confidence in the classroom has suffered. Peggy Orenstein asserts, “By sixth grade, it is clear that both girls and boys have learned to equate maleness with opportunity and femininity with constraint.” (Orenstein, 1994, p. xiv).

The passage into female adolescence is marked by a loss of confidence (Orenstein, 1994). More academically prominent is the loss of confidence as it relates to the girls’ math and science skills. Physically and mentally prominent are a critical attitude of her own body and personal inadequacy (p. xvi).

Self-efficacy has been linked to career choice (Hou et al, 2006). More importantly, a positive level of self-efficacy can motivate a student in preparation for their next stage in school, which eventually can affect career choice (Rule & Griesemer, 1996). If a girl has a conduit through which she can channel her motivation and remain on track, her goals will appear more attainable. Through

the use of technology such as PowerPoint, Microsoft Word, and email, the contemporary adolescent's progress toward her career of choice is more lucid.

In the elementary classroom, teachers employ both an overt and a hidden curriculum (Orenstein, 1994). Both ideas communicate to students the proper behavior, and how this behavior should be executed. What the students don't know is that the teacher is actually in control of this mission. Socialization during the school day establishes a hierarchy within the class and within the school. The teacher perpetuates this hierarchy with his or her actions. For example, a student can display one personality on the playground, but when it is time to present his or her knowledge in the classroom, a contradictory persona may appear.

As a young girl approaches adolescence, one of the defining, observable character traits is self-efficacy. Bandura (1997) defines self-efficacy as "the exercise of human agency through people's beliefs in their capabilities to produce desired effects by their actions" (p. vii). The path to self-efficacy begins at birth, giving babies opportunities to learn that they can carry out actions independently. As children enter school, the teacher continues to foster this confidence in themselves and their abilities. If a child's numerous different teachers have been successful at creating and maintaining a properly stable student, the transition from childhood to adolescence should be smooth. However, if interruptions or obstacles such as a parent divorce, transferring to a new school, or a death in the family occurs, the emotional and/or academic hindrances may be dire.

Extraordinary resilience can be detected in some adolescents for whom childhood was a tragic event. In addition to the aforementioned events, Bandura lists “chronic poverty, discord, physical abuse, parental alcoholism, or serious mental disorders” as hardships, but not insurmountable events (Bandura, 1997, p. 172). An efficacious adult can emerge from these events. Typically, a stable caregiver or other adult is present in the child’s life to “offer emotional support and guidance, promote meaningful values and standards, model constructive styles of coping, and create numerous opportunities for mastery experience” (p. 172).

An adolescent’s peers can validate his or her self-efficacy as much as an adult can. Experienced and competent peers will provide models on which the adolescent can base his or her actions. This comparative efficacy will aid the adolescent in determining the best choice of peer and of activity (Bandura, 1997). Conversely, socially inefficacious adolescents “exhibit social withdrawal, perceive low acceptance by their peers, and have a low sense of self-worth” (p. 173). Thus, it may be concluded that these adolescents did not experience mentoring by a caring adult during their crucial developmental years. Unfortunately, they may also make the wrong friend choices, possibly in turn affecting their own self-efficacy.

During adolescence, girls and boys differ greatly in their descriptions of themselves. Girls’ concerns gravitate around their appearance and social behavior, specifically how they treat others (Harter, 1999). Two-thirds to three-fourths of the adolescents studied by Harter commented that they are

"dissatisfied with some aspect of their looks" (p. 220). "When I try to do something with my face and hair and it doesn't work out and I think I'm ugly, then I get depressed" is a typical explanation of this result (p. 220). In this instance, low self-worth is the cause of the observed depression. In other cases, depression can already exist and can be the causal factor in a feeling of low self-worth. "I got depressed because I got into a fight with my friend and thought I wasn't a good person." would be an example of the latter (p. 223). The implications in the classroom are manifold, considering the link between self-worth and self-efficacy.

Media and self-efficacy. The media can project an image that may affect an adolescent's self-efficacy greatly. From the time girls are old enough to talk, they have internalized society's established and accepted female images. Girls aspire to be a "princess" or don frilly attire to assert this promulgated image. As girls enter kindergarten, a code of beauty already exists. By the time they reach the transition to junior high school, their reputation is firmly established. Early adolescence is a time for acceptance and approval by peers. If this acceptance is not achieved, a young girl's self-efficacy can be shattered. Devoid of a sense of belonging, the girl's academic achievement typically suffers. When adolescent girls and their friends compare themselves to the images and idols featured on television and online, both their self-efficacy and their self-esteem are in question (Baldwin, 2006).

Albert Bandura's observations (Bryant & Zillmann, 1994) of how media can influence psychosocial behavior can be described through his social

cognitive theory. As aforementioned in the section on educational technology, the term “media” has evolved since his research was conducted. Even though Bandura’s reference to media implies television and visual print, it can be applied to today’s version of “media,” meaning social networking and other types of digitized socialization. These social influences can permeate the classroom social structure and affect self-efficacy, which in turn affects academic performance.

Educational technology and self-efficacy. Bandura’s aforementioned theories, along with educational technology, can merge to create an investigative topic. Both social learning theory and observational learning theory contribute to this combination. When students observe each other and vicariously boost their self-efficacy (Bandura, 1986), the effect is palpable.

Another notable causal relationship between educational technology and self-efficacy may be the transfer into other realms of the student’s life (Evans, 1989). If a student feels confident in his or her academic abilities, will this quality shift into non-academic areas of the student’s life? For example, this new found elevated self-efficacy could manifest itself on the baseball field, at the piano, or possibly in the way any new task is approached.

> The empowerment model states, “If you create motivational conditions for learning, raise children’s sense of intellectual efficacy, provide them with support and guidance and create academic norms and standards to which children can aspire, they will become good learners” (Evans, 1989, p. 17).

In the quote above, Bandura outlines the prescription for effective teaching. Whether or not the use of technology influences the level of student motivation is dependent upon the teacher's willingness to implement it. Bandura (1993) continues, "The rapid pace of technological change and accelerated growth of knowledge are placing a premium on capability for self-directed learning" (p. 136).

Bandura states, "We need to have a theory that acknowledges that the modes of human influence have been altered radically by these revolutionary changes" (Evans, 1989, p. 6). The confluence of educational technology and self-efficacy may satisfy this need.

Summary of the Literature

This literature review was conceived with three conceptual themes that formed the research questions in mind: educational technology, gender differences in technology, and self-efficacy. All three of these themes are relevant to the sixth grade classroom, but very few of the studies discovered were specifically reflective of this age group. Within educational technology, Larry Cuban (1986, 2001) is the one of the most recognized scholars, with publications dating back to the 1980s. Paul Saettler (1990) wrote a comprehensive history of educational technology, but it does not include developments that have occurred in the past twenty years. Gender differences have been researched in relation to technology. Colley (2003) and Sanders (2005), provided a more specific description of the issue. Albert Bandura (1977a,

1977b, 1986, 1993, 1994, 1997) is the pioneer of self-efficacy and influenced many protégés, including Schunk, Bryant, and Zimmerman.

The ideas presented in this literature review relate directly to the research questions that were outlined in Chapter One. The issues of educational technology and self-efficacy are relevant to the current state of education. As our students enter higher education and the workforce, a lack of skills in the area of technology will serve as a disadvantage. Not only within the United States, but also internationally, our students will better market themselves if they have acquired technological skills as well as a high level of self-efficacy. To intertwine and examine these two constructs is an attempt to augment our previous knowledge about cognition by updating our definition of media.

The importance of educational technology and high self-efficacy will be conveyed to our students if it begins with the teachers. Comfortably utilizing technological devices insinuates to students that technology is necessary and an enhancement to learning. When teachers demonstrate a high level of self-efficacy in their teaching, students receive the message that confidence in your craft is fundamental to success.

Research Questions

The following questions were developed in order to ascertain the effect of educational technology on sixth graders' self-efficacy:

1. To what degree is the use of educational technology linked to sixth graders' high self-efficacy, as indicated by frequency of use?
2. Which factors indicate the greatest difference between girls' and boys' self-efficacy?
3. Which external factors influence elevated self-efficacy, as perceived by the student?

Chapter 3
Research Methods

Purpose

The purpose of conducting a mixed-methods study was to obtain both quantitative and qualitative data, providing a broader snapshot of how educational technology is linked to sixth graders' self-efficacy. The student questionnaire and teacher focus groups contributed different perspectives, from a pre-adolescent's self-evaluation to a professional educator's observational perspective. The quantitative data from the student questionnaire was the primary method for answering the research questions, while the qualitative data from the teacher focus groups provided supplemental, direct quotes through personal interface.

Population and Sample

The population in this study was elementary school students from several schools in one school district in Southern California. The selection of different schools provided a variety of socioeconomic and ethnic demographics. This district was chosen because of its recent implementation of "21st century classrooms," meaning the classrooms are equipped with interactive whiteboards (Smart/Interwrite boards), mounted projectors, one laptop for every two students, one teacher and one student microphone, document camera (Elmo), and in some rooms an electronic student response system (referred to as "Clickers"). Various school sites may have independently purchased additional educational technology aids through site-based funds.

Through this one particular school district, there was access to approximately 900 sixth grade students, the intended sample. The involvement of individual students depended upon the agreement of the school's principal and each teacher, as well as parent permission. The total number of student participants was 190 students. Out of 26 sixth grade teachers, 16 teachers participated in the focus groups.

The study concentrated on sixth graders in general education classrooms. Due to the multi-age design of the special education classrooms (SDC), these students did not participate in the study. However, students who have Individualized Education Plans (IEPs) and are mainstreamed in the regular education classroom were invited to participate. Participants may have an IEP for speech or may participate in the Resource Specialist Program (RSP) to receive extra, individualized support in specific learning areas. Other participants were English Learners (ELs), students who speak or have spoken a language other than English in the home. These students' skills vary from a Beginning (Level 1) to Advanced (Level 5) understanding of the English language. These levels are determined by the students' performance on the California English Language Development Test (CELDT). Though the questionnaire was administered in English, the parent consent form was sent home in Spanish for families with the need for translation.

By the time a student reaches sixth grade, he or she has had exposure to several different teachers, each of whom implements technology differently in his or her classroom. For this reason, studying sixth grade students was appealing

to the researcher. In addition, the researcher has had extensive experience working with the eleven to twelve year old age group. Students at this age become very interested in trends, especially technological trends. To improve students' academic success, there is a possibility that the comfort level achieved while using educational technology facilitates a close correlation.

Key Variables

The researcher investigated key dependent and independent variables. Chosen in alignment with the research questions, these variables served as the basis for data analysis. The main dependent variable was the degree of self-efficacy. This level was determined by the students' perceived evaluation of their self-efficacy through three questions on the student questionnaire. Corresponding independent variables included students' technology use inside and outside the classroom, students' prior experience with technology, students' attitude towards technology, current use by academic subject, learning improvement with technology, confidence, self-concept, and student demographics. All of these variables were collected within the questionnaire as a result of student self-evaluation.

Frequency tables were created to visually represent the data from the student questionnaire. After all data were entered into SPSS, the tables were created and analyzed. These tables provided an overview of the results and facilitated decisions regarding analysis. Though independent-dependent variable relationships were predicted prior to data collection, the results produced some unforeseen adjustments.

Research Design

The research design was based on a mixed-method theory of both quantitative and qualitative data acquisition. An online questionnaire was developed using the website SurveyMonkey.com, with the intent of appealing to sixth graders (see Appendix A for questionnaire). A paper and pencil questionnaire might have appeared as more of a chore, inhibiting honest and forthright answers. From the researcher's work with and observation of sixth graders, they are more apt to be willing participants if technology is involved. In addition, an online questionnaire supported the researcher's claims, research questions, and overall topic.

Student questionnaire. The quantitative method of data collection by means of a questionnaire was chosen for several reasons. Due to the researcher's full time teaching schedule, a solely qualitative study seemed both impossible and impractical. In order to ensure confidentiality and create a minimally invasive environment, the questionnaire option appeared to be a more practical choice. Adolescents are sometimes skeptical of unfamiliar adults and apprehensive in communicating with them. Considering the aforementioned factors, statistical significance would have been impossible if not for the survey method. (See Appendix A for questionnaire.)

Several existing self-efficacy scales were studied over the course of developing the instrument. Bandura (2006) suggests the development of content-specific self-efficacy scales, rather than evaluation based upon a general

self-efficacy scale. Scales have been developed for use in studying information literacy, among others.

The objective of this study required a slightly different scale than Bandura's content-specific suggestion. The research questions do not enquire about self-efficacy within the context of using educational technology. Rather, the study was built around the idea that educational technology can influence a sixth grader's general academic self-efficacy in the classroom. Therefore, the questionnaire was designed to obtain information about technology use, self-concept, and general self-efficacy. Eventually, the concepts coalesced to investigate the link between technology and its effect on self-efficacy in the classroom.

The questionnaire included a carefully constructed introductory message to the participant. It was the researcher's hope that the participants willfully completed the survey, without the influence of an adult or peers. However, this issue was out of the researcher's control and can be considered a limitation. The message requested honest answers to the best of the participant's ability. The terms frequently used in the survey were defined here as well. Many sixth graders know the definitions of "technology" and "confidence," but the researcher wanted to ensure a clear understanding of the terms. Technology was simply defined as "computers." Confidence was defined as "how you feel about yourself and your abilities, knowing you can do something." It was realized that the terms "confidence" and "self-efficacy" are not always used interchangeably, but for the purposes of this study it was necessary to use the term confidence. Sixth

graders are more likely to understand the term confidence and relate to it, based upon their own knowledge and the encouragement they have received from parents, teachers, and other mentors.

With the consideration of the research questions in mind, the researcher formulated the questions. Integrating technology and self-efficacy into each question would have been redundant and ineffective, so the questionnaire commenced with presenting the topics separately. The first two questions enquired as to frequency of technology use inside and outside the classroom to establish each student's familiarity with educational technology. The next questions ask about the frequency of technology use in previous grades and within certain subject areas, specifically reading, writing, math, social studies, and science. These questions were presented in an "item-in-a-series format, with a common introduction that defines the general question and response format…" (Dillman, 2007, p. 100). Attitude toward technology was also asked, as this factor may influence decreased self-efficacy. In general, sixth graders favor technology and regard it positively, as observed by the researcher. However, some students may view technology unfavorably, due to frustration or unfamiliarity with it. For this reason, the attitude question was necessary.

The next questions that were developed focused on the topics of learning, confidence, and self-concept. Students were asked to rate whether or not they feel their learning improves when they use computers and how confident they are in their learning in general. To possibly determine causality, students were asked to rate how confident they were before they began using computers in

class and whether or not their confidence in their abilities changed in a positive way after they began using computers in class. Students were also asked to choose the situation in which they feel most confident. The self-concept questions centered around difficulty in school, academic success, behavior, and self-importance in the classroom.

The self-efficacy domain included three questions that were modeled after the generalized self-efficacy scale (Schwarzer & Jerusalem, 1995). The researcher chose the topics that related most specifically to the sixth grade age group. The topics of goal setting, problem solving, and composure comprised the variables to determine level of self-efficacy.

After the demographic questions were asked, the final question of the survey asked the participant to enumerate additional information in an open-ended response. The intention was that these responses would provide additional data and narrative. Specifically because of this question, it was important to enable the IP address blocking feature in Survey Monkey. When this feature is enabled, it is impossible to trace individual surveys back to the computer on which they were completed.

The questionnaire was pre-tested in a participatory environment, involving sixth graders who were not included in the actual study. No data were electronically collected from these students. Essentially, the students participated in a cognitive interview, allowing for comments and questions about the format of the instrument. As a result of this pre-test, some minor changes were made to the questionnaire. Specifically, the students were confused about

the use of the term “technology.” It was interesting to observe the different interpretations of the term. For example, technology was not interpreted solely as modern devices used for educational purposes in the classroom. Some students revealed their understanding of technology to mean the clock, the pencil sharpener, and the stapler. Fortuitously, as a result of this pre-test, the term technology was replaced with simply “computers” on much of the questionnaire.

Teacher focus groups. To collect the qualitative data and contribute the teachers’ perspective to the study, focus groups were conducted. Out of the 26 potential sixth grade teacher participants in the district, 16 were willing participants in the focus groups. The actual number of participants was dependent upon the teachers’ desire and willingness to participate. When the initial contact was made with the teachers to solicit their students’ participation in the project, the researcher indicated that teacher participation in a focus group would be appreciated, but not required.

The focus group agenda was developed based upon the same themes as those of the questionnaire. Though it was impossible to pose the exact same questions to the students and teachers, the researcher attempted to glean the same information as it appeared from the teachers’ perspective. As aforementioned, it is impossible to identify the student participants in the study, but would be interesting to note commonalities between the student and teacher responses. Identical to the first question in the questionnaire, the teachers were asked to identify the types of educational technology in use in their classrooms. The teachers were asked to describe their students’ attitudes toward computers,

just as students were asked to describe their own attitudes. A sense of the teachers' comfort level was obtained in the next two questions, as well as in which subjects they use technology.

In relation to self-efficacy, questions were formulated in which teachers would gauge the observed general level in the classroom, as well as improvement and differences according to gender. The responses to this question supplemented the quantitative results in answering research question #2. The importance of acquiring this data from both the student questionnaire and the teachers' perspectives was implied from the corroboration of the gender question.

Institutional Review Board (IRB) Approval

In order to protect the minor participants in this study and ethically inform all participants, it was necessary to obtain IRB approval from CGU. Because children were involved in this study, full board approval was necessary before data collection could commence. The researcher developed the parental consent, teacher consent, and student assent forms to inform the participants and legal guardians of their rights. It was imperative to obtain voluntary consent from all participants. Appendices provide the consent and assent forms in their entirety.

Sample versions of recruitment emails and other types of anticipated email communication were included in the IRB protocol. The only changes made to these samples were the inclusion of specific teacher names and communication surrounding individual questions or issues from teachers. The

student questionnaire and focus group agenda were approved by the IRB as well. Appendices A and B provide these data collection instruments.

District approval was necessary to conduct research within the school district. The same materials that were submitted to CGU's IRB were submitted to the Assistant Superintendent for Educational Services in order to obtain approval from the cabinet. Once approval was granted, the process of recruitment and data collection began.

Acquisition of the Data

The two methods employed to acquire the data were the student questionnaire and teacher focus groups, yielding both quantitative and qualitative data. The student questionnaire was created and administered via Survey Monkey (see Appendix A for complete questionnaire). The principals and sixth grade teachers of the elementary schools were contacted through district email. Both students and parents were required to sign a consent form to authorize participation. Completion of the survey was executed at school, as Internet access is not readily available in all homes.

Since the data was collected in the middle of the school year, many teachers were able to infuse technology into their students' assignments to communicate an ongoing district expectation. Hopefully, the teachers will continue to integrate technology throughout the remainder of the school year. Granted, some teachers are instinctually adept at educational technology or have furthered their knowledge through professional development or continuing education. Other teachers are implementing technology slowly, while many

teachers still hold an aversion to technology. Currently, teacher credentialing programs are emphasizing educational technology as part of their teacher training. Because of this emphasis, newer teachers are typically more comfortable with the integration of technology into their students' daily assignments and projects.

Student questionnaire. The sixth graders were given a website address to obtain access to the survey. Once access was achieved, they were presented with an introductory message. The purpose of this message was to set the participant at ease, reinforcing that his or her participation is important. If an answer to a question is unknown, it was requested that the question be answered to the best of the participant's ability. However, if a question evoked discomfort, the participant had the right to skip that question or cease their involvement in the project by clicking on "exit this survey." This option was explained in the consent and assent forms, and was reiterated in an email to the teachers.

The purpose of the questionnaire was to gauge the level of self-efficacy in concrete terms. Because self-efficacy cannot always be accurately analyzed through observation, self-evaluation by students is a more measurable method (Bandura, 1986). However, sometimes students may misjudge their own level of self-efficacy, either by overestimating or underestimating their abilities. For this reason, it was important to anonymously acquire data from the teachers' perspectives as well. Even though teachers observe the students' behaviors

peripherally, their insights and knowledge of each student's abilities would either corroborate or conflict with the students' questionnaire responses.

Teacher focus groups. Focus groups were comprised of at least three participating teachers. In the original email communication, the teacher was asked whether or not he or she would be willing to participate in a focus group. A date, time, and meeting place were established by the researcher. An agenda was developed (see Appendix B) and was distributed to the participants via email before the meeting occurred.

During the focus group session, the researcher first put the group at ease with an informal welcome. The goal of the meeting was communicated to participants. Next, ground rules were reviewed to provide each participant with an equal opportunity for contribution. To conclude the discussion in the promised amount of time, the researcher carefully watched the clock during this time, but allowed for free discussion. The entire meeting was digitally audio recorded to capture all important comments.

Analytical Methods

Student questionnaire. Survey Monkey collected and stored the data on their website as the students completed the questionnaire. After the deadline for completing the questionnaire passed and the questionnaire was no longer accessible to students, the researcher accessed and downloaded the data from the website onto her computer. The data were managed using the Statistical Package for the Social Sciences (SPSS) Version 18. The data were organized into tables, guided by the researcher's established dependent and independent

variables. Frequency counts of each result were displayed. At this point, how the data were dispersed begin to emerge and prominent themes became obvious. To run the appropriate tests on the data, the researcher used SPSS Version 18 once again. The different types of analysis are detailed below, organized according to each research question.

1. To what degree is the use of educational technology linked to sixth graders' high self-efficacy, as indicated by frequency of use?

To answer this question, the researcher ran a complete correlation between all entered variables. The researcher selected a bivariate, Pearson correlation with a two-tailed test of significance. Significant correlations were flagged. The correlations provided a measurement of the extent to which the variables correspond (Hoyle, Harris, & Judd, 2002). Statistical significance would be evident through the examination of this correlation matrix.

2. Which factors indicate the greatest difference between girls' and boys' self-efficacy?

To answer this question, the researcher separately analyzed the female and male responses through an independent samples t-test. The t-test provided an analysis of the differences between the means of male and female responses (Krathwohl, 1993). Hypothetically, no differences exist between the female and male respondents. However, according to recent literature (e.g. Colley, 2003), differences exist in preferences and purpose of use. The researcher chose the three self-efficacy questions as the testing variables and the gender question as the grouping variable.

3. Which external factors influence elevated self-efficacy as perceived by the student?

To answer this question, the researcher ran three stepwise multiple regression analyses, using the three variables within the self-efficacy domain as the three separate dependent variables. All variables except the self-efficacy domain variables were entered into the analysis as independent variables. The missing values were replaced with the mean, due to the large amount of missing data from the student responses.

Table 1 displays each variable within the questionnaire and the plans for coding to prepare for SPSS analysis.

Table 1

Variables and Coding for SPSS Analysis

Question Number	Variable	Variable Label	Variable Type	Coding
1	How often do you use the following types of technology in your classroom?	CLASTECH	ordinal	4, 3, 2, 1
2	How often do you use the following types of technology outside of school?	OUTTECH	ordinal	4, 3, 2, 1
3	Before this school year, how often did you use computers in school?	PREVTECH	ordinal	5, 4, 3, 2, 1
4	What is your feeling about talking in front of the class?	TALKCLAS	interval	3, 2, 1
5	What is your attitude toward using computers and other devices at school?	ATTITECH	interval	3, 2, 1
6	How often do you use computers in the following subjects?	SUBTECH	ordinal	3, 2, 1
7	My learning improves when I complete an assignment with computers.	LEARNIMP	ordinal	4, 3, 2, 1
8	Please rate how you feel about your learning in general.	GENLEARN	ordinal	4, 3, 2, 1
9	Before I began using computers in class, I was a pretty confident person.	BEFRCOMP	ordinal	4, 3, 2, 1

10	My confidence in my abilities changed in a positive way after I began using computers in my classroom.	CONFTECH	ordinal	4, 3, 2, 1
11	In which situations do you feel most confident?	CONFSITU	nominal	1, 2, 3, 4, 5
12	School is easy for me.	SCHLEASY	ordinal	4, 3, 2, 1
13	I usually get good grades.	GOODGRAD	ordinal	4, 3, 2, 1
14	I behave well and follow the rules at school.	SCHOLBEH	ordinal	4, 3, 2, 1
15	I am important to my class.	IMPCLASS	ordinal	4, 3, 2, 1
16	When I set a goal, I usually accomplish it.	ACCGOAL	ordinal	4, 3, 2, 1
17	When I am faced with any problem, I can usually solve it.	PROBSOLV	ordinal	4, 3, 2, 1
18	When things don't go as planned, I don't freak out.	PLANFREK	ordinal	4, 3, 2, 1
19	What is your gender?	GENDER	dichotomous	1, 2
20	Do you receive free or reduced lunch?	LUNCH	dichotomous	1, 2
21	Do you receive special education services?	SPECED	dichotomous	1, 2
22	What is your ethnicity?	ETHAFAM ETHANWHT ETHASAM ETHLATHI ETHNAAN ETHPACIS ETHOTHER	dichotomous	1, 2

The questions were organized into topical domains in order to group the data more efficiently. Questions 1-3, related to technology use, were kept separate due to the multiple variable responses. Questions 4 and 5 were included in the "attitude" domain. Question 6, related to computer use by academic subject, was grouped separately due to multiple variable responses. Questions 7 and 8 were grouped in the "learning" domain. Questions 9 and 10 were grouped under the "confidence" domain. Questions 12-15 referred to self-concept and were included to provide an antecedent to a self-efficacy assessment. Questions 16-18 were included in the "self-efficacy" domain, concluding the section.

The demographic questions (Q19-Q22) were especially crucial to this study's analysis. Question 19 enquired as to the student's gender. Research question #2 (Which factors indicate the greatest difference between girls' and boys' self-efficacy?) required the comparison of responses based upon Question 19. The responses indicated nearly balanced participation between males and females. Hypothetically, no differences would exist between male and female responses. Within the reviewed literature, it was explained that males and females value technology differently, one reason for the selection and development of this research question.

Question #20 enquired about free or reduced lunch status. This demographic offered information about parent income, though it is more of a rough estimate than a precise amount. To qualify for free or reduced lunch status in the state of California, the family household income must be at or below

a certain amount, dependent upon the number of household members. For example, a family of four would qualify for free lunch if their annual household income is at or below $29,055 (CDE, 2011). For reduced lunch status, the same family of four would qualify with an annual household income at or below $41,348 (CDE, 2011). By sixth grade, a student probably knows whether or not their parents pay for their lunch. In the event that this question evoked discomfort, as the introductory message stated, the student could skip it.

Special education services status is asked in Question 21. The student was asked whether or not they receive support from the Resource Specialist Program (RSP), speech services, or Special Day Class (SDC). Typically, a general education sixth grade self-contained classroom will have a few RSP students and possibly a few speech students. However, some schools cluster their RSP students within one general education classroom. If the number of RSP students within the grade level is unusually high, it is possible to have more than one RSP cluster per grade level. These students qualify as special education after undergoing psychological and academic testing to determine a learning disability. Students may also qualify for RSP under "other health impaired" (OHI) if their condition is affecting academic performance. Federal regulations define OHI as "chronic or acute health problems such as asthma, attention deficit disorder or attention deficit hyperactivity disorder, diabetes, epilepsy, a heart condition, hemophilia, lead poisoning, leukemia, nephritis, rheumatic fever, and sickle cell anemia" (Grice, 2002, p. 7). The importance of differentiating between general education and special education students lies

within the recent research on the utilization of specific technology for special education students (Ayala, 2010). RSP students in a pull-out program may receive instruction or practice skills in an academic setting other than their own classroom. This supplemental integration of technology provides the RSP student with additional strategies with which they may succeed in the general education classroom.

Question #22 enquires about student ethnicity. The term "click all that apply" was used to include, rather than marginalize, students who might identify themselves as mixed or bi-racial. Within data analysis, each of these choices was treated as its own separate dichotomous variable.

Reliability. In SPSS, a reliability analysis was performed. Using the Cronbach's alpha model for 45 items, the result was 0.816. This result is considered "good" and the instrument was deemed reliable.

Teacher focus groups. Narrative points from the teachers' perspectives were obtained during the focus groups. To protect confidentiality, the questionnaire was designed to make the linkage between a particular student and his or her teacher impossible. Though it would have been interesting to discover if students and teachers were congruous in their responses, it will remain a mystery. The focus groups provided the personal perspectives and opinions of the teachers.

The qualitative data obtained from the focus group was analyzed for content. This content analysis revealed themes within the teachers' responses, but the same variable domains established with the student questionnaire were

used for analysis as well. Since the teachers are experiencing the implementation of educational technology firsthand, their reference to the ideas that were discussed in the literature review served as essential testimony. Because the teachers all work in the same district, it is possible that some common themes surfaced. However, different school sites have different needs and allocate their technology expenditures according to their specific students' needs. Depending upon the teachers' familiarity with technology, their responses varied as well. For instance, if a teacher holds a graduate degree in educational technology, his or her responses would differ greatly from a digital immigrant who is more comfortable assigning paper and pencil activities.

Reliability. Patton (1990) states, "The validity and reliability of qualitative data depend to a great extent on the methodological skill, sensitivity, and integrity of the researcher." (p. 11). Since there is no statistical tool to determine reliability qualitatively, such as Cronbach's alpha in quantitative analysis, the researcher was forced to rely upon the structure of the questions to assure reliability.

Limitations of the Study

Several limitations existed within this study. It was imperative to involve children in the study to obtain a firsthand perspective and represent self-evaluation, rather than the perception of an outsider. Consequently, each child's participation was dependent upon the parent's consent. Though the possibility of pressuring from parents to complete the survey existed, hopefully the student desired to be involved in the study of his or her own volition.

Unfortunately, the possibility of fraudulent data also existed. Though it was clarified to the student that this survey would not affect his or her grades or academic performance in any way, sometimes students can become nervous when asked about their performance at school. This nervousness could trigger feelings of either grandiosity or inadequacy, resulting in an inaccurate self-assessment. Hopefully, each participant's answers were honest and forthright, but that quality is difficult to control.

Since the teachers could not be forced to participate in the focus group, this self-selected sample was comprised of volunteers who were willing to voice their opinions and offer their perspectives. The focus groups took place after school, so the participants were required to sacrifice their personal time. The participants either had the desire to support a fellow educator or the desire to have their opinions heard.

Higher scores indicated higher self-efficacy, while lower scores indicated lower self-efficacy. The reliability of the questionnaire instrument was tested after the data collection. Due to the fact that the questionnaire maintained the participants' confidentiality, inter-rater reliability was impossible to obtain. The instrument was developed specifically for this study and the specific interest of the researcher. Bandura (1986) suggests crafting self-efficacy scales to measure specific topics. Even though general self-efficacy can be measured, relating it to a specialized area offers more meaning to the data.

Both the questionnaire data and the focus group data were collected at one specific point in time. This cross-sectional data limitation only provided the

researcher with one snapshot of the students' and teachers' perspectives. The responses could have been affected by the participants' particular mood that day or even physical or biological limitations, such as hunger or fatigue.

Delimitations of the Study

This study occurred in only one school district, though the schools involved differed in their demographics. The schools ranged from those in the northern section of the district, whose students typically come from affluent families, to those in the southern section, whose students' families typically struggle financially. These stereotypes are based in fact. Dependent upon the type of emotional and academic support provided by parents or other caregivers, each student has developed either a high or low level of self-efficacy.

This district holds a special interest in educational technology, thus indoctrinating the students and teachers with a specific philosophy. Teachers in this district are continually offered both paid and unpaid professional development opportunities in technology. Both teachers and students are still learning educational technology and its myriad features and possibilities. Though it is expected that each teacher will integrate technology into his or her teaching, it is not a requirement. Each individual teacher and student has his or her own understanding and attitude toward educational technology. These different perspectives were represented through the questionnaire responses and the focus group discussion. One district's perspective of a national trend is represented through this study.

Chapter 4
Data Analysis and Results

Research Questions

The following questions were examined in order to ascertain the effect of educational technology on sixth graders' self-efficacy:

1. To what degree is the use of educational technology linked to sixth graders' high self-efficacy, as indicated by frequency of use?
2. Which factors indicate the greatest difference between girls' and boys' self-efficacy?
3. Which external factors influence elevated self-efficacy, as perceived by the student?

Questionnaire

Purpose. The participating sixth grade students completed the questionnaire via the website Survey Monkey. In order to collect data from a student's perspective, it was necessary to obtain responses in this anonymous format. As aforementioned, it would have been informative to link student responses with their teacher's responses in the focus groups, but confidentiality precluded this result.

Recruitment results. Once the recruitment emails were sent out, the first responses came from the principals of the participating schools. The principals consented to their teachers' and students' involvement in the project, then the researcher arranged the details with the participants. Many teachers were enthusiastically willing to participate, but some teachers were too overwhelmed with their instructional duties to consent to involvement. As expected, not all

teachers felt they could spare the time to participate due to the time it would detract from their teaching. The researcher was understanding with these teachers, as she shares the same responsibilities.

The teachers sent home the consent and assent forms and collected them from the students. The protocol prohibited student coercion, so the students who returned the consent forms were fully willing participants. In some classrooms, teachers administered the questionnaire in one sitting, while in other classrooms students completed the questionnaire as they returned their consent forms. Teachers were instructed to use the method that was most appropriate for their schedule and learning environment.

Student responses. The participating students hailed from seven different schools in the district. Interestingly, an almost equal sample of boys and girls was obtained. One hundred ninety students completed the questionnaire during classtime at school, on the school laptops.

Data preparation. The questionnaire results were downloaded from Survey Monkey to Excel, and then to SPSS. It was necessary to recode the data because Survey Monkey's ranking system was opposite of the preference of the researcher. The updated coding system was consistently positive (scored high) to negative (scored low).

Missing data. Missing data values were entered into SPSS as "99" in every case in which a response was not given. Due to the fact that eleven and twelve year olds were completing the questionnaire, some missing data were expected. The number of missing responses varied, dependent upon the

question, but ranged from two missing responses to 39 missing responses. Only two students neglected to answer the first question on the questionnaire, which enquired about the frequency of laptop use inside the classroom. As the questionnaire progressed, the number of missing responses increased. Thirty-nine students neglected to answer the question about ethnicity, the penultimate question of the questionnaire. Possibly, students felt uncomfortable with this question, as they were not required to answer questions that caused discomfort. There were no questions for which missing data did not exist.

Descriptive statistics. The following tables and accompanying narratives illustrate the frequencies of each examined variable, described by the number of responses (*n*) and the valid percentages for each variable. The mean and standard deviation were also included to provide evidence of both measures of central tendency and measures of dispersion. The total number of respondents per variable (*N*) is listed in the note below each table.

Table 2

Descriptive Statistics for Frequency of Educational Technology Use Inside the Classroom

Educational Technology	Every day (4)		A few times a week (3)		A few times a month (2)		Never (1)			
	n	valid %	*n*	valid %	*n*	valid %	*n*	valid %	*M*	*SD*
Laptops[a]	16	8.5	114	60.6	53	28.2	5	2.7	2.75	0.64
Desktops[b]	3	1.9	21	13.4	14	8.9	119	75.8	1.41	0.79
Smart/Interwrite[c]	94	57.7	21	12.9	25	15.3	23	14.1	3.14	1.13
Clickers[d]	6	3.9	18	11.7	44	28.6	86	55.8	1.64	0.84

Note. *M*=mean, *SD*=standard deviation. [a]Missing (99) = 2 students. *N* = 188. [b]Missing (99) = 33 students. *N* = 157. [c]Missing (99) = 27 students. *N* = 163. [d]Missing (99) = 36 students. *N* = 154.

The first question the students answered on the questionnaire enquired about how often they use technology inside their sixth grade classroom, as shown in Table 2. Though many of the questions referred to simply "computers," as explained in Chapter 3, this question explicitly asked about the types of technology in the classroom. The response options for these four questions were coded on a four-point scale: every day (4), a few times a week (3), a few times a month (2), and never (1). Laptop computer use inside the classroom ranged from 114 students (60.6%) using laptops a few times a week to five students (2.7%) who never used laptops in class, with two missing responses. Desktop computer use inside the classroom ranged from 119 students (75.8%) who never used desktops to three students (1.9%) who used desktops every day, with 33 missing responses. The Smart/Interwrite board use inside the classroom ranged

from everyday use by 94 students (57.7%) to use a few times a week by 21 students (12.9%), with 27 missing responses. Clicker (student handheld response system) use inside the classroom ranged from 86 students (55.8%) who never used Clickers to six students (3.9%) who used Clickers every day, with 36 missing responses.

Table 3

Descriptive Statistics for Frequency of Technology Use Outside the Classroom

	Every day (4)		A few times a week (3)		A few times a month (2)		Never (1)			
Technology	*n*	valid %	*n*	valid %	*n*	valid %	*n*	valid %	*M*	*SD*
Laptops[a]	67	38.7	52	30.1	21	12.1	33	19.1	2.88	1.13
Desktops[b]	38	22.8	50	29.9	31	18.6	48	28.7	2.47	1.13
iPod[c]	110	61.1	32	17.8	13	7.2	25	13.9	3.26	1.09
iPad[d]	67	40.1	35	21	18	10.8	47	28.1	2.73	1.25
Smart phones[e]	52	31.9	23	14.1	11	6.7	77	47.2	2.31	1.34
Video games[f]	56	32	61	34.9	39	22.3	19	10.9	2.88	0.98

Note. *M*=mean, *SD*=standard deviation. [a]Missing (99) = 17 students. *N* = 173. [b]Missing (99) = 23 students. *N* = 167. [c]Missing (99) = 10 students. *N* = 180. [d]Missing (99) = 23 students. *N* = 167. [e]Missing (99) = 27 students. *N* = 163. [f]Missing (99) = 15 students. *N* = 175.

The students were asked how often they use various types of technology outside the classroom, as displayed in Table 3. Laptop computers, desktop computers, iPods, iPads, smart phones, and video games were the choices offered, though students may have other devices they use outside the classroom.

The response options for these questions were coded on a four-point scale: every day (4), a few times a week (3), a few times a month (2), and never (1). Laptop computer use outside the classroom ranged from everyday use by 67 students (38.7%) to a few times a month by 21 students (12.1%), with 17 missing responses. Desktop computer use outside the classroom ranged from a few times a week by 50 students (29.9%) to a few times a month by 31 students (18.6%), with 23 missing responses. An iPod or other music device was used outside the classroom every day by 110 students (61.1%) and ranged to a few times a month by 13 students (7.2%), with ten missing responses. An iPad was used outside the classroom every day by 67 students (40.1%) and ranged to use a few times a month by 18 students (10.8%), with 23 missing responses. Smart phone use outside the classroom ranged from 77 students (47.2%) who never use smart phones to eleven students (6.7%) who use smart phones a few times a month, with 27 missing responses. Video games were played outside the classroom by 61 students (34.9%) every day and ranged to 19 students (10.9%) who never play video games, with 15 missing responses.

Table 4

Descriptive Statistics for Previous Experience with Computers

	Every day (5)		A few times a week (4)		A few times a month (3)		Never (2)		Can't remember (1)			
Grade	*n*	valid %	*n*	valid %	*n*	valid %	*n*	valid %	*n*	valid %	*M*	*SD*
5[a]	23	12.3	92	48.1	54	29.9	10	5.3	8	4.3	2.72	0.76
4[b]	14	7.4	47	27.3	62	35.2	30	17	23	13.1	2.3	0.89
3[c]	13	7.6	27	15.9	44	25.9	41	24.1	45	26.5	2.1	0.98
2[d]	9	5.3	22	13	34	20.1	53	31.4	51	30.2	1.9	0.97
1[e]	6	3.5	15	8.8	23	13.5	60	35.3	66	38.8	1.68	0.93
K[f]	5	2.9	11	6.4	18	10.5	76	44.4	61	35.7	1.5	0.85

Note. *M*=mean, *SD*=standard deviation. [a]Missing (99) = 3 students. *N* = 187. [b]Missing (99) = 14 students. *N* = 176. [c]Missing (99) = 20 students. *N* = 170. [d]Missing (99) = 21 students. *N* = 169. [e]Missing (99) = 20 students. *N* = 170. [f]Missing (99) = 19 students. *N* = 171.

Table 4 shows students' responses when asked about their experience with computers prior to this school year. From kindergarten to fifth grade, they were asked to recall how often they used computers in the classroom. For all the grade levels below sixth grade, the responses were coded on a five-point scale: every day (5), a few times a week (4), a few times a month (3), never (2), and can't remember (1). In fifth grade, computer use ranged from 92 students (48.1%) a few times a week to eight students (4.3%) who couldn't remember, with three missing responses. In fourth grade, computer use ranged from 62 students (35.2%) a few times a month to 14 students (7.4%) using computers every day, with 14 missing responses. In third grade, computer use ranged from

45 students (26.5%) who couldn't remember to 13 students (7.6%) who used computers every day, with 20 missing responses. In second grade, computer use ranged from 53 students (31.4%) who never used computers to nine students (5.3%) who used computers every day, with 21 missing responses. In first grade, computer use ranged from 66 students (38.8%) who couldn't remember to six students (3.5%) who used computers every day, with 20 missing responses. In kindergarten, computer use ranged from 76 students (44.4%) who never used computers to five students (2.9%) who used computers every day, with 19 missing responses.

Table 5

Descriptive Statistics for Attitude Domain Variables

	Love it (3)		It's okay (2)		Hate it (1)			
Variable	*n*	valid %	*n*	valid %	*n*	valid %	*M*	*SD*
Talking in front of the class[a]	35	18.7	111	59.4	41	21.9	1.97	0.64
Using computers and other devices at school[b]	131	70.4	50	26.9	5	2.7	2.68	0.52

Note. *M*=mean, *SD*=standard deviation. [a]Missing (99) = 3 students. *N* = 187. [b]Missing (99) = 4 students. *N* = 186.

The students were asked two questions which pertained to their attitudes in the classroom. Table 5 displays the results regarding talking in front of the class and using computers and other devices at school. These responses were coded on a three-point scale: love it (3), it's okay (2), and hate it (1). The majority of students (*n* = 111, 59.4%) responded that they feel okay about talking

in front of the class, with three missing responses. For the second attitude question, which asked how students feel about using computers and other devices at school, the majority of students (*n* = 131, 70.4%) responded that they love it, with four missing responses.

Table 6

Descriptive Statistics for Current Classroom Computer Use by Academic Subject

Academic Subject	All the time (3)		Sometimes (2)		Never (1)			
	n	valid %	*n*	valid %	*n*	valid %	*M*	*SD*
Reading[a]	35	19	106	57.6	43	23.4	1.96	0.65
Writing[b]	60	33.1	100	55.2	21	11.6	2.22	0.64
Math[c]	16	9	68	38.4	93	52.5	1.57	0.65
Social Studies[d]	21	11.8	95	53.4	62	34.8	1.77	0.64
Science[e]	21	11.7	110	61.1	49	27.2	1.84	0.61

Note. *M*=mean, *SD*=standard deviation. [a]Missing (99) = 6 students. *N* = 184. [b]Missing (99) = 9 students. *N* = 181. [c]Missing (99) = 13 students. *N* = 177. [d]Missing (99) = 12 students. *N* = 178. [e]Missing (99) = 21 students. *N* = 180.

Table 6 displays current classroom computer use, demarcated by academic subject. The response options for the five academic subjects were coded on a three-point scale: all the time (3), sometimes (2), and never (1). In reading, the majority of students (*n* = 106, 57.6%) sometimes use computers, with six missing responses. In writing, the majority of students (*n* = 100, 55.2%) sometimes use computers, with nine missing responses. In math, the majority of students (*n* = 93, 52.5%) never use computers, with 13 missing responses. In social studies, the majority of students (*n* = 95, 53.4%) sometimes use

computers, with 12 missing responses. In science, the majority of students (*n* = 110, 57.6%) sometimes use computers, with 21 missing responses.

Table 7

Descriptive Statistics for Learning Domain Variables

	Completely agree (confident) (4)		Somewhat agree (confident) (3)		Somewhat disagree (lacking in confidence) (2)		Completely disagree (not confident) (1)			
Variable	*n*	valid %	*n*	valid %	*n*	valid %	*n*	valid %	*M*	*SD*
Learning improves with computers[a]	57	30.5	104	55.6	17	9.1	9	4.8	3.12	0.76
Rate confidence in learning[b]	89	48.9	72	39.6	16	8.8	5	2.7	3.35	0.76

Note. *M*=mean, *SD*=standard deviation. [a]Missing (99) = 3 students. *N* = 187. [b]Missing (99) = 8 students. *N* = 182.

Questions pertaining to the domain of learning were grouped together in Table 7. The response options for these four questions were coded on a four-point scale: completely agree (4), somewhat agree (3), somewhat disagree (2), and disagree (1). The first variable details the students' assessment of whether or not their learning improves when they use computers in the classroom. The responses ranged from 104 students (55.6%) answering that they somewhat agree to nine students (4.8%) answering that they completely disagree, with three missing responses. Students were then asked to rate their level of confidence in their learning in general. The responses ranged from 89 students (48.9%) answering that they are completely confident in their abilities to five

students (2.7%) answering that they are not confident in their abilities, with eight missing responses.

Table 8

Descriptive Statistics for Confidence Domain Variables

	Completely agree (4)		Somewhat agree (3)		Somewhat disagree (2)		Completely disagree (1)			
Variable	*n*	valid %	*n*	valid %	*n*	valid %	*n*	valid %	*M*	*SD*
Confidence before using computers in class[a]	81	44	73	39.7	25	13.6	5	2.7	3.25	0.79
Confidence changed in a positive way[b]	57	31.1	82	44.8	32	17.5	12	6.6	3.01	0.87

Note. *M*=mean, *SD*=standard deviation. [a]Missing (99) = 6 students. *N* = 184. [b]Missing (99) = 7 students. *N* = 183.

Table 8 displays data within the confidence domain, which included questions pertaining to students' confidence before they began using computers in class and whether or not their confidence changed in a positive way after they began using computers in class. For the first question, "Before I began using computers in class, I was a pretty confident person," the responses ranged from 81 students (44%) answering that they completely agree to five students (2.7%) answering that they completely disagree, with seven missing responses. The second question in the confidence domain stated, "My confidence in my abilities changed in a positive way after I began using computers in my classroom." The responses ranged from 82 students (44.8%) answering that they somewhat

agree to twelve students (6.6%) answering that they completely disagree, with seven missing responses.

Table 9

Descriptive Statistics for Self-Concept Domain Variables

	Completely agree (4)		Somewhat agree (3)		Somewhat disagree (2)		Completely disagree (1)			
Variable	*n*	valid %	*n*	valid %	*n*	valid %	*n*	valid %	*M*	*SD*
School is easy for me.[a]	50	27	100	54.1	25	13.5	10	5.4	3.03	0.79
I usually get good grades.[b]	88	48.6	69	38.1	18	9.9	6	3.3	3.32	0.79
I behave well and follow the rules at school.[c]	102	55.4	65	35.3	13	7.1	4	2.2	3.44	0.72
I am important to my class.[d]	71	38.8	68	37.2	27	14.8	17	9.3	3.05	0.95

Note. *M*=mean, *SD*=standard deviation. [a]Missing (99) = 4 students. *N* = 185. [b]Missing (99) = 9 students. *N* = 181. [c]Missing (99) = 6 students. *N* = 184. [d]Missing (99) = 7 students. *N* = 183.

Four separate questions were grouped together under the domain "self-concept" in Table 9. The response options for these four questions were coded on a four-point scale: completely agree (4), somewhat agree (3), somewhat disagree (2), and disagree (1). For the first question, "School is easy for me," the responses ranged from 100 students (54.1%) answering that they somewhat agree to ten students (5.4%) answering that they completely disagree, with four

missing responses. The second self-concept question stated, “I usually get good grades.” Responses ranged from 88 students (48.6%) answering that they completely agree to six students (3.3%) answering that they completely disagree, with nine missing responses. The next question in the self-concept domain stated, “I behave well and follow the rules at school.” Responses ranged from 102 students (55.4%) answering that they completely agree to four students (2.2%) answering that they completely disagree, with six missing responses. The last question in the self-concept domain was “I am important to my class.” Responses ranged from 71 students (38.8%) answering that they completely agree to 17 students (9.3%) answering that they completely disagree, with seven missing responses.

Table 10

Descriptive Statistics for Self-Efficacy Domain Variables

	Completely agree (4)		Somewhat agree (3)		Somewhat disagree (2)		Completely disagree (1)			
Variable	*n*	valid %	*n*	valid %	*n*	valid %	*n*	valid %	*M*	*SD*
Accomplish goal[a]	81	44.5	84	46.2	12	6.6	5	2.7	3.32	0.72
Solve problem[b]	80	44.2	86	47.5	13	7.2	2	1.1	3.35	0.66
Don’t freak out[c]	63	34.8	75	41.4	29	16	14	7.7	3.03	0.91

Note. *M*=mean, *SD*=standard deviation. [a]Missing (99) = 8 students. *N* = 182. [b]Missing (99) = 9 students. *N* = 181. [c]Missing (99) = 9 students. *N* = 181.

The domain of self-efficacy was created to encompass questions on accomplishing goals, solving problems, and not freaking out when things don’t go

as planned, as shown in Table 10. The response options for these four questions were coded on a four-point scale: completely agree (4), somewhat agree (3), somewhat disagree (2), and disagree (1). For the first question, "When I set a goal, I usually accomplish it," responses ranged from 84 students (46.2%) answering that they somewhat agree to five students (2.7%) answering that they completely disagree, with eight missing responses. The second question in the self-efficacy domain was "When I am faced with any problem, I can usually solve it." Responses ranged from 86 students (47.5%) answering that they somewhat agree to two students (1.1%) answering that they completely disagree, with nine missing responses. The third question in the self-efficacy domain was "When things don't go as planned, I don't freak out." Responses ranged from 75 students (41.4%) answering that they somewhat agree to 14 students (7.7%) answering that they completely disagree, with nine missing responses.

Table 11

Descriptive Statistics for Gender[a]

	n	valid %
Boy	92	49.7
Girl	91	50.3
Total	*N* = 183	100

Note. [a]Missing (99) = 7 students.

Table 11 details the gender breakdown of the student participants. Ninety-two boys (49.7%) completed the questionnaire, while 91 girls (50.3%) participated. Seven students skipped this question.

Table 12

Descriptive Statistics for School Services

	Yes		No	
Service	*n*	valid %	*n*	valid %
Free/reduced lunch[a]	85	47.8	93	52.2
Special ed services[b]	18	9.9	163	90.1

Note. [a]Missing (99) = 12 students. *N* = 178. [b]Missing (99) = 9 students. *N* = 181.

Table 12 shows the types of school services the participants currently receive. Eighty-five students (47.8%) receive free or reduced lunch. Twelve students skipped this question. Eighteen students (9.9%) receive special education services. Nine students skipped this question.

Table 13

Descriptive Statistics for Ethnicity[a]

	African American/ Black	Anglo/ White	Asian American/ Asian	Latino/ Hispanic	Native American/ Alaskan Native	Pacific Islander	Other[b]
n	28	67	20	82	13	6	16
%	15.4	36.8	11	45.1	7.1	3.3	8.8

Note. Students were given the option "click all that apply" in this question. Consequently, the percent total did not equal 100, as some students may have chosen more than one ethnicity to describe themselves. [a]Thirty-nine students skipped this question. [b]Other ethnicities included Indian (*n* = 2), Middle Eastern (*n* = 2), Russian (*n* = 1).

Table 13 displays the different ethnicities of the student participants. Twenty-eight students (15.4%) described themselves as African American or black. Sixty-seven students (36.8%) described themselves as Anglo or white. Twenty students (11%) described themselves as Asian American or Asian. Eighty-two students (45.1%) described themselves as Latino or Hispanic. Thirteen students (7.1%) described themselves as Native American or Alaskan Native. Six students (3.3%) described themselves as Pacific Islander. Sixteen students (8.8%) describe themselves as a different ethnicity, under the "other" category. The ethnicities outside the categories offered were Indian (*n* = 2), Middle Eastern (*n* = 2), and Russian (*n* = 1). Several students chose the "other" option, but listed one of the offered ethnicities. Thirty-nine student participants skipped this question.

Descriptive and inferential statistics to answer research questions.

To accurately answer the posed research questions and draw conclusions for the

study, methods of both descriptive and inferential statistics were used. For RQ #1, a correlation matrix was developed to identify significance between variables, from which the pertinent data were gleaned. For RQ #2, an independent samples t-test was run to identify any differences between male and female respondents. For RQ #3, stepwise multiple regression analyses were run to identify several independent predictor variables and their effect on the dependent variable.

Research question #1. To what degree is the use of educational technology linked to sixth graders' high self-efficacy, as indicated by frequency of use? Tables 14-19 represent the results of correlating the variables in both the confidence and self-efficacy domains, including use of technology both inside and outside the classroom, as well as by academic subject. Inclusion of confidence domain variables in this section supplement the self-efficacy variables. The total number of respondents is represented by *N* for each correlation.

Table 14

Pearson Correlation Coefficients Between Frequency of Educational Technology Use Inside the Classroom and Confidence Domain Variables

Educational Technology	Learning in general			Confidence before computers			Confidence in abilities changed		
	r	Sig.	*N*	*r*	Sig.	*N*	*r*	Sig.	*N*
Laptops	.159	.033*	180	.077	.299	182	.200	.007**	181
Desktops	.036	.661	149	.003	.968	153	.027	.744	151
Smart or Interwrite	.038	.642	155	.093	.245	158	.015	.857	156
Clickers	.119	.151	147	-.102	.216	149	-.081	.331	147

Note. *p < .05, two-tailed. **p < .01, two-tailed.

Table 14 displays Pearson correlations between frequency of educational technology use inside the classroom and the confidence domain variables. The correlation coefficient between using laptops inside the classroom and students' confidence in their learning in general shows a small effect (*r* = .159), while showing significance (p = .033). Another significant result (p = .007) appeared between using laptops inside the classroom and "My confidence in my abilities changed in a positive way after I began using computers in my classroom." A small to medium effect (*r* = .200) accompanied this result. A small effect (*r* = .119) resulted from using Clickers inside the classroom and students' confidence in their learning in general, but showed no significance. Using Clickers inside the classroom also showed a small effect (*r* = -.102) when correlated with "Before I began using computers in class, I was a pretty confident person."

Table 15

Pearson Correlation Coefficients Between Frequency of Educational Technology Use Inside the Classroom and Self-Efficacy Domain Variables

Educational Technology	Accomplish goals			Solve problems			Don't freak out		
	r	Sig.	*N*	*r*	Sig.	*N*	*r*	Sig.	*N*
Laptops	.038	.608	180	.143	.056	179	.097	.199	179
Desktops	-.012	.881	151	-.125	.128	151	.011	.893	150
Smart or Interwrite	.047	.562	156	.168	.036*	156	.070	.390	155
Clickers	-.033	.697	146	.072	.389	145	-.101	.225	145

Note. *p < .05, two-tailed.

Table 15 displays Pearson correlation coefficients between frequency of educational technology use inside the classroom and self-efficacy domain variables. The relationship between using laptops inside the classroom and solving problems resulted in a small effect (*r* = .143) and approached significance (p = .056). The relationship between using a Smart/Interwrite board inside the classroom and solving problems resulted in a small effect (*r* = .168) and was significant (p = .036).

Table 16

Pearson Correlation Coefficients Between Frequency of Technology Use Outside the Classroom and Confidence Domain Variables

	Learning in general			Confidence before computers			Confidence in abilities changed		
Technology	*r*	Sig.	*N*	*r*	Sig.	*N*	*r*	Sig.	*N*
Laptops	.084	.283	166	-.057	.467	167	.112	.152	166
Desktops	.138	.081	161	.144	.067	163	.143	.070	161
iPods	.088	.247	173	-.021	.785	175	.136	.074	173
iPads	.146	.065	160	.169	.032*	162	.163	.039*	160
Smart phones	.161	.044*	157	-.058	.467	159	.172	.030*	158
Video games	.033	.671	168	.049	.524	171	.126	.102	169

Note. *p < .05, two-tailed.

Table 16 displays Pearson correlations between frequency of technology use outside the classroom and the confidence domain variables. A small effect (*r* = .138) between using desktops outside the classroom and confidence in learning in general appeared. A small effect (*r* = .144) appeared between using desktops outside the classroom and the students' level of confidence before using computers in class, and this correlation approached significance (p = .067). A small effect (*r* = .143) appeared between using desktops outside the classroom and "My confidence in my abilities changed in a positive way after I began using computers in my classroom." This correlation approached significance (p = .070). A small effect (*r* = .136) appeared between using iPods outside the classroom and "My confidence in my abilities changed in a positive way after I began using computers in my classroom." This correlation approached

significance (p = .074). A small effect (*r* = .146) appeared between iPads and confidence in learning in general, with an approaching significance (p = .065). A small effect (*r* = .169) appeared between using iPads outside the classroom and confidence before using computers in class, accompanied by a significant relationship (p = .032). A small effect (*r* = .163) appeared between using iPads outside the classroom and "My confidence in my abilities changed in a positive way after I began using computers in my classroom." This correlation showed a strong significance (p = .039). A small effect (*r* = .161) appeared between using smart phones outside the classroom and confidence in learning in general, and was significant (p = .044). A small effect (*r* = .172) appeared between using smart phones outside the classroom and "My confidence in my abilities changed in a positive way after I began using computers in my classroom." This relationship was significant (p = .030).

Table 17

Pearson Correlation Coefficients Between Frequency of Technology Use Outside the Classroom and Self-Efficacy Domain Variables

	Accomplish goals			Solve problems			Don't freak out		
Technology	*r*	Sig.	*N*	*r*	Sig.	*N*	*r*	Sig.	*N*
Laptops	.074	.344	165	.079	.313	164	-.070	.376	164
Desktops	.117	.140	161	.108	.173	160	.106	.182	160
iPods	.163	.032*	172	.122	.111	171	.025	.748	171
iPads	.190	.017*	159	.209	.008**	158	.013	.874	158
Smart phones	.162	.043*	156	.085	.291	156	.007	.929	155
Video games	-.101	.194	168	-.121	.121	167	-.039	.617	167

Note. *p < .05, two-tailed. **p < .01, two-tailed.

Table 17 displays Pearson correlation coefficients between frequency of technology use outside the classroom and self-efficacy domain variables. The relationship between using iPods outside the classroom and accomplishing goals resulted in a small effect (*r* = .163) and was significant (p = .032). The relationship between using iPads outside the classroom and accomplishing goals resulted in a small effect (*r* = .190) and was significant (p = .017). The relationship between using iPads outside the classroom and solving problems resulted in a small effect (*r* = .209) and was significant (p = .008). The relationship between using smart phones outside the classroom and accomplishing goals resulted in a small effect (*r* = .162) and was significant (p = .043).

Table 18

Pearson Correlation Coefficients Between Frequency of Educational Technology Use by Academic Subject and Confidence Domain Variables

Academic Subject	Learning in general			Confidence before computers			Confidence in abilities changed		
	r	Sig.	*N*	*r*	Sig.	*N*	*r*	Sig.	*N*
Reading	.132	.079	178	.048	.525	180	.099	.186	179
Writing	.153	.043*	175	.090	.231	177	.195	.010**	176
Math	.154	.044*	171	.062	.416	174	.045	.561	172
Social Studies	-.066	.389	172	-.005	.943	175	.279	<.001**	174
Science	-.028	.710	174	-.002	.976	177	.230	.002**	176

Note. *p < .05, two-tailed. **p < .01, two-tailed.

Table 18 displays Pearson correlation coefficients between frequency of educational technology use by academic subject and the confidence domain

variables. The relationship between the frequency of using computers in reading and confidence in learning in general resulted in a small effect (*r* = .132) and approached significance (p = .079). The relationship between the frequency of using computers in writing and confidence in learning in general resulted in a small effect (*r* = .153) and was significant (p = .043). The relationship between the frequency of using computers in writing and "My confidence in my abilities changed in a positive way after I began using computers in my classroom" resulted in a small effect (*r* = .195) and was significant (p = .010). The relationship between the frequency of using computers in math and confidence in learning in general resulted in a small effect (*r* = .154) and was significant (p = .044). The relationship between the frequency of using computers in social studies and "My confidence in my abilities changed in a positive way after I began using computers in my classroom" resulted in a medium effect (*r* = .279) and was significant (p = <.001). The relationship between the frequency of using computers in science and "My confidence in my abilities changed in a positive way after I began using computers in my classroom" resulted in a small effect (*r* = .230) and was significant (p = .002).

Table 19

Pearson Correlation Coefficients Between Frequency of Educational Technology Use by Academic Subject and Self-Efficacy Domain Variables

Academic Subject	Accomplish goals			Solve problems			Don't freak out		
	r	Sig.	*N*	*r*	Sig.	*N*	*r*	Sig.	*N*
Reading	.007	.923	178	.028	.716	177	.069	.358	177
Writing	.176	.020*	175	.193	.011*	174	.082	.280	174
Math	.152	.048*	171	.060	.439	170	-.103	.183	170
Social Studies	.068	.372	173	.010	.899	172	.101	.189	172
Science	-.032	.673	175	-.056	.463	174	.068	.370	174

Note. *p < .05, two-tailed.

Table 19 displays Pearson correlation coefficients between frequency of educational technology use by academic subject and self-efficacy domain variables. The relationship between the frequency of using computers in writing and accomplishing goals resulted in a small effect (*r* = .176) and was significant (p = .020). The relationship between the frequency of using computers in writing and solving problems resulted in a small effect (*r* = .193) and was significant (p = .011). The relationship between using computers in math and accomplishing goals resulted in a small effect (*r* = .152) and was significant (p = .48).

Research question #2. Which factors indicate the greatest difference between girls' and boys' self-efficacy? Independent samples t-tests were performed to ascertain the differences between males and females in relation to high self-efficacy. Both the confidence and self-efficacy domains were

considered in investigating this research question. The decision to include both the confidence and self-efficacy domain variables was based upon the correlations that were performed to answer RQ #1. The results are presented in Tables 20 and 21.

Table 20

Independent Samples t-tests Comparing Gender Differences Within Confidence Domain Variables

	t-test for Equality of Means				
Variable	*t*	*df*	sig. (two-tailed)	Mean diff.	Std. Error Diff.
Learning in general					
Assumed	-.164	175	.870	-.019	.11379
Not assumed	-.164	174.57	.870	-.019	.11382
Confidence before computers					
Assumed	.100	178	.920	.01186	.11838
Not assumed	.100	175.19	.920	.01186	.11860
Confidence in abilities changed					
Assumed	1.486	177	.139	.18989	.12781
Not assumed	1.484	171.43	.140	.18989	.12793

Table 20 displays independent samples t-tests that compare gender differences within the confidence domain variables. These three variables within the confidence domain did not show any significance from either Levene's Test or the t-test for Equality of Means.

Table 21

Independent Samples t-tests Comparing Gender Differences Within Self-Efficacy Domain Variables

	t-test for Equality of Means				
Variable	*t*	*df*	sig. (two-tailed)	Mean diff.	Std. Error Diff.
Accomplish goals					
Assumed	.585	179	.559	.06276	.10729
Not assumed	.585	178.85	.559	.06276	.10727
Solve problems					
Assumed	.899	178	.370	.08889	.09886
Not assumed	.899	171.28	.370	.08889	.09886
Don't freak out					
Assumed	1.819	179	.071	.24347	.13385
Not assumed	1.821	172.96	.070	.24347	.13371

Note. Equal variances not assumed.

Table 21 displays independent samples t-tests that compare gender differences within the self-efficacy domain variables. Levene's Test showed marginal significance (p = .051) for "When things don't go as planned, I don't freak out," so equal variances were not assumed. Within the self-efficacy domain, the variable "When things don't go as planned, I don't freak out." is the only variable that approached significance (p = .070).

Research question #3. Which external factors influence elevated self-efficacy, as perceived by the student? Tables 22-24 display the results of independent variables versus the dependent variable of high self-efficacy, as evaluated through the self-efficacy domain variables. In separate analyses, each of the self-efficacy domain variables was entered into SPSS, each as a dependent variable in order to predict their values from the independent variables

(Field, 2005). All variables except the self-efficacy domain variables were entered as independent variables to maximize the results. Due to the large amount of missing data from the student responses, missing values were replaced with the mean.

Table 22

Stepwise Multiple Regression Analysis of External Influencing Factors Within Self-Efficacy Domain Variables[a]

Variable	Standardized Coefficient Beta	t	Sig.
I am important to my class.	.361	5.233	<.001
I usually get good grades.	.149	2.133	.034
Before this school year, how often did you use computers in school? 5th grade?	-.167	-2.680	.008
My confidence in my abilities changed in a positive way after I began using computers in my classroom.	.189	2.926	.004
Do you receive special education services?	-.145	-2.198	.029
How often do you use computers in the following subjects? Science?	-.135	-2.110	.036

Note. [a]Dependent Variable: When I set a goal, I usually accomplish it. R = .553; R^2 = .306; Adj. R^2 = .283; F = 13.452; Sig. = <.001.

The multiple regression analysis in Table 22 uses "When I set a goal, I usually accomplish it." as the dependent variable. Five independent variables emerged as predictors of the dependent variable. These predictors include "I am important to my class." (β = .361), "I usually get good grades." (β = .149), "Before this school year, how often did you use computers in school? (5th grade)" (β = -.167), "My confidence in my abilities changed in a positive way after I began

using computers in my classroom." (β = .189), "Do you receive special education services?" (β = -.145), and "How often do you use computers in the following subjects? (in science)" (β = -.135). The coefficient of determination (R^2) was .306 and the Adjusted R^2 was .283.

Table 23

Stepwise Multiple Regression Analysis of External Influencing Factors Within Self-Efficacy Domain Variables[a]

Variable	Standardized Coefficient Beta	t	Sig.
Please rate how you feel about your learning in general.	.195	2.691	.008
I behave well and follow the rules at school.	.214	3.180	.002
I am important to my class.	.193	2.610	.010
How often do you use the following types of technology in your classroom? Smart/ Interwrite?	.162	2.545	.012
How often do you use the following types of technology outside of school? iPads?	.154	2.414	.017

Note. [a]Dependent Variable: When I am faced with any problem, I can usually solve it. R = .515; R^2 = .265; Adj. R^2 = .245; F = 13.297; Sig. = <.001.

Table 23 shows the multiple regression analysis with "When I am faced with any problem, I can usually solve it." entered as the dependent variable. The independent variables that emerged as predictors were "Please rate how you feel about your learning in general." (β = .195), "I behave well and follow the rules at school." (β = .214), "I am important to my class." (β = .193), "How often do you use the following types of technology in your classroom? (Smart/Interwrite board)" (β = .162), and "How often do you use the following types of technology

outside of school? (iPads)" (β = .154). The coefficient of determination (R^2) was .265 and the Adjusted R^2 was .245.

Table 24

Stepwise Multiple Regression Analysis of External Influencing Factors Within Self-Efficacy Domain Variables[a]

Variable	Standardized Coefficient Beta	t	Sig.
What is your attitude toward using computers and other devices at school?	.174	2.501	.013
I behave well and follow the rules at school.	.236	3.338	.001
In which situations do you feel most confident?	.180	2.647	.009
What is your gender?	-.163	-2.303	.022
What is your ethnicity? African American/Black?	.137	2.010	.046

Note. [a]Dependent Variable: When things don't go as planned, I don't freak out. R = .391; R^2 = .153; Adj. R^2 = .130; F = 6.661; Sig. = <.001.

Table 24 shows the multiple regression analysis with "When things don't go as planned, I don't freak out." entered as the dependent variable. The independent variables that emerged as predictors were "What is your attitude toward using computers and other devices at school?" (β = .174), "I behave well and follow the rules at school." (β = .236), "In which situations do you feel most confident?" (β = .180), "What is your gender?" (β = -.163), and "What is your ethnicity? (African American/Black)" (β = .137). The coefficient of determination (R^2) was .153 and the Adjusted R^2 was .130.

Content analysis of student text. The final question of the questionnaire was an open-ended request for narrative response. Though these results are qualitative, they are included in the quantitative analysis section as a supplement. The question read “Is there anything else you would like to tell me about computers and how you feel when you use them?” Many students responded to this question in earnest, while a few chose to comment comically. Nonetheless, the comments were analyzed for themes and organized visually.

Thematic variable domains. The following variables appeared within the student open-ended response sections, either in the “other” answer choice that accompanied most questions, or at the end of the questionnaire.

Frequency of educational technology use inside the classroom. Several students commented on how, when, and which devices they use inside the classroom. Students added “tablet,” “Nook” (e-book reader), “Moby” (mobile device to control the interactive whiteboard), and “Elmo” (document camera) to the choices offered on the questionnaire. In the open-ended section, one student commented, “I can get more information when I use computers but I don’t need them all the time.”

Frequency of technology use outside the classroom. Students responded on their use of technology outside the classroom, which was not necessarily for educational use. One student commented that they used a Nook (e-book reader), four students commented that they watched television outside of school, and one student commented that they listen to the radio outside of school. Another student responded, “I actually like electronics A LOT better at home.”

Similarly, “I would like using iPads better or cooler computers. A computer isn’t all that fun or interesting since I use technology a lot at home.”

Attitude. The overwhelming majority of the students responded positively to using computers and other technology at school. A few negative attitudes were evident. “I think they are fun to use but they get annoying when you do research and you can’t find what you need,” complained one student. Nervousness was evident as well: “I feel nervous a little because I think I might mess the computer up.” Other negative comments explained how computers are disruptive in class and students should not use computers at school because of the excessive amount of time spent using them outside of school.

Current computer use by academic subject. Most students commented that computers are currently used for word processing and research during writing time. Another student commented that they use computers during social studies and science time in their class. Math and reading were also mentioned as academic subjects in which computers are used. All academic subjects were mentioned at least once.

Learning. Students agree that computers enhance learning and complement traditional lessons. One student observed, “I feel that computers are helpful in ways that I never even knew. I now can find help or answers to my questions and homework.” One theme that emerged was the fact that computers make learning fun.

Confidence. The students who responded to the open-ended question submitted confident answers, but also referenced the term “confidence” in their

responses. “I feel that computers help me feel more confident in my answers,” was one admission. “I feel connected to all the knowledge on Earth and I feel very confident about it,” responded another student.

Self-efficacy. From the open-ended responses, it is obvious that computers assist in helping students achieve their goals and believe in themselves. “I like it and it makes me feel free and it helps me in and out of school,” responded one student. “I feel like I can accomplish more because I was born with lots of computer smarts and I can type 25 WPM,” shared another student.

Summary of quantitative findings. The quantitative findings obtained from the student questionnaires revealed the perspectives of the students, analyzed by frequencies, correlations, t-tests, and multiple regression analyses. The frequencies described the mean, standard deviation, and missing data for each question. The correlations indicated several significant results, including using laptops ($p = .056$) and the Smart/Interwrite board ($p = .036$) in class, correlating significantly with students’ ability to problem solve. Students’ beliefs in their ability to accomplish goals significantly correlated with using iPods ($p = .032$), iPads ($p = .017$), and smart phones ($p = .043$) outside the classroom. The students’ beliefs in their ability to problem solve also correlated significantly with using iPads outside the classroom ($p = .008$). Using computers during writing time in class was correlated significantly with accomplishing goals ($p = .020$) and problem solving ($p = .011$). During math time, the use of computers was correlated significantly with accomplishing goals ($p = .048$).

Inferentially, the t-tests revealed only one instance of significance that was barely marginal. Levene's Test indicated marginal significance ($p = .051$), so equal variances were not assumed, resulting in marginal significance for "When things don't go as planned, I don't freak out." ($p = .070$). Additionally, the multiple regression analyses offered possible predictor variables and the strength between the identified independent and dependent variables. The self-concept domain variables were identified as independent variables in all three multiple regression analyses. When accomplishing a goal was the dependent variable, the strongest independent variable predictor emerged as "I am important to my class." ($\beta = .361$). When problem solving was the dependent variable, the strongest independent variable predictor emerged as "I behave well and follow the rules at school." ($\beta = .214$). For the final regression, when not freaking out when things don't go as planned was the dependent variable, the strongest independent variable predictor emerged as "I behave well and follow the rules at school." ($\beta = .236$). These results will be discussed further in the following chapter.

Focus Groups

Purpose. The focus group sessions were held to collect data from the teachers' perspectives. The students were given an opportunity to voice their self-evaluations through the questionnaire, but the teachers' comments gave an alternative perspective from which to analyze the data. It was the researcher's hope to identify common themes among the teacher and student responses.

Recruitment results. To accommodate the teachers' schedules, the researcher offered to meet each participating sixth grade team during their weekly planning and collaboration time. The researcher only met with teams comprised of at least three sixth grade teachers. Some of the less-populated schools in the participating district only have two teachers assigned per grade level, which could compromise the reliability of the instrument. To ensure the confidentiality of the teachers, and as aforementioned in Chapter 3, the schools were labeled A-E and the teachers were described as 1-4, depending on the number of participants. Years of experience were noted and sometimes used as a descriptor, especially when necessary to validate the comment. The participating teachers were willing to give their opinions and expand on their personal experiences in their own classrooms related to educational technology and student self-efficacy.

Descriptive statistics. The five focus groups were comprised of sixteen teachers. Four of the focus groups consisted of three teachers each, and one focus group consisted of four teachers. Overall, the teachers ranged in years of experience from four years to thirty-six years. Because of the assurance of confidentiality, the combinations of years of experience according to individual sixth grade teams cannot be revealed.

Content analysis. Some main themes emerged from the data collection, as predicted by the researcher's a priori design (Neuendorf, 2002). These variable domains are identical to those of the student questionnaire.

Thematic variable domains. The following variables were used to analyze the comments offered by the teachers during the focus groups. These variables were intentionally duplicated from the student questionnaire, in order to substantiate the student responses.

Frequency of educational technology use inside the classroom. Teachers reported the different types of both hardware and software they use in their classrooms. All teachers reported using teacher and student computer laptops in the classroom. Other hardware included the Smart/Interwrite board, the document camera (Elmo), microphones, Clickers, Moby, and cell phones for texting students. Software included Microsoft Word and PowerPoint, Discovery Education (Unitedstreaming) videos, READ 180, Brain Pop, Internet for research, Study Island, Spelling City, Pixie, Google Earth, and Reading Counts. Many teachers commented that they would use more technology in their classroom if they had the time to experiment with it and were assured that it would be reliable. "I just feel like I never have enough time to play around with it and I think that's something you really have to do, especially with the Interwrite board…I've been to trainings, but unless you're actually doing it right then, it's hard to remember," commented a teacher with 18 years of experience.

Frequency of technology use outside the classroom. Obviously, the teachers could not confirm the type of technology used outside the classroom. Many teachers made assumptions about whether or not students have computers in their home. However, these assumptions were based upon the

socioeconomic composition of the school. A teacher with 12 years of experience commented,

> "I just think that their self-efficacy actually has to do with their home towards using technology. Their access to technology at home increases their knowledge and their ability to use the software we have available to us, if they have it in their home. So it expedites their ability to get things done versus a classmate that doesn't have the same opportunity in their home to work on things outside of school."

At home, students are using technology for purposes that are not necessarily educational. "She just does not have any motivation. Her mom says at home she's Facebooking, on it all the time, those sorts of things, but in education she's just not connecting to it." The technology used at home is serving a different purpose from that which the teachers are trying to promote at school.

Previous experience with computers. Some teachers volunteered information about their students' previous experience with computers, as it was not an explicit focus group question. Some teachers were not sure which teachers in the lower grades use technology in their classrooms. For example, some students had experience using Pixie in their previous grades and transferred that knowledge to their use of PowerPoint. Students' experience with computers, both previous and current, is completely dependent upon the teacher's comfort level and desire to implement the technology.

Attitude. The majority of teachers responded that their students have reacted positively to the educational technology in the classroom. When teachers use the Smart/Interwrite board for instruction, "you have their full attention when you turn it on." Another teacher commented, "They also respond to anything that's novel, anything that's new." Overall, students have shown a positive attitude while using technology, but it's an expectation. "Everything with technology is an assumption." "It's positive. Definitely 100% positive, but also 100% expected." Technology has been employed to attempt to improve students' attitudes. "I have one gal who has been out of school for maybe two years. She's pretty low and she's yet to really go on the computer. The kids are using it paired up. She's very shy and apprehensive."

Current computer use by academic subject. Teachers commented on how often they use computers in each academic subject. All academic subjects (reading, writing, math, social studies, and science) were mentioned individually. Many teachers instantly replied that they use technology in every academic subject. One teacher commented, "It's just part of how we do things." Technology use within certain subjects was implied in enhancing self-efficacy. "I would say especially in writing because they have that spell check and they know that it's misspelled." Writing was the most frequently mentioned subject. Most teachers commented that they use technology during math for concept or facts practice, rather than to create a product. PowerPoints are mostly created during social studies and science lessons. A few teachers use technologies such as

digital still and video cameras, with which their students create multimedia projects to demonstrate their knowledge of a certain concept.

Learning. The teachers offered many ways they use technology in their classrooms to enhance learning. Videos are used to introduce a new concept, students create PowerPoints to reinforce new concepts, and different websites are used to practice previously learned concepts. A teacher with eight years of experience commented,

> "I think it's more not that they believe in themselves because they use technology, I think that they think that learning is fun and it's more accessible to them than just, 'Let's look at the document camera.' They're enjoying it more."

Confidence. The concept of self-confidence was mentioned frequently during the focus groups. "They have that confidence to go experiment and in turn it's really helping them acquire new skills because they're not afraid to go out there and find a different way to do something or learn a new skill." A teacher with 18 years of experience commented,

> "I think with my students it's really helped some of them boost their self-confidence just because they've caught on more quickly and they're able to help somebody else who doesn't get it. That makes them kind of shine, gives them something that they're good at."

Self-efficacy. Teachers commented on how using technology in their classrooms has helped their students with achieving goals and believing in their

abilities, both aspects of self-efficacy. A teacher with 35 years of experience commented,

> "This little kid did not know how to do a PowerPoint. One of our girls showed him how to do it in five minutes. In the next half hour, he had put together something on gods and goddesses. He was up to the principal showing her. It's amazing how fast they grasp it."

The idea that students use technology to help them complete their assigned tasks and reach their academic goals resonated with several of the teachers. "I don't have any shrinking violets. They feel like they can take on whatever," voiced a teacher with 34 years of experience. Other teachers expressed that their students have a range of abilities and the use of technology helps with differentiation in the classroom. "I really see a bell shaped curve. Maybe not your traditional one…" As their students utilize technology more frequently, they are noticing a palpable difference. "I definitely see a comfort and a belief in themselves increasing."

Gender. Teachers were asked to compare the level of self-efficacy in the male and female students in their classrooms. Most of the teachers responded that they do not observe large differences between boys' and girls' self-efficacy. Both boys and girls were mentioned as wanting to help others. One teacher with seven years of experience commented, "I think that a lot of the boys feel like they're better in areas and will voice it and the girls are just as good and they just are quiet about it."

School services. Several teachers commented that the use of technology in the classroom has served their special education students positively. The reading program READ 180 was mentioned by several teachers to aid either special education students or general education students who struggle with reading. "And there are some kids that might struggle academically in some subjects, but they're very strong with technology and you can see in those kids that they have a confidence that they can help you out," noticed a teacher with 15 years of experience.

> "I know when there's a kid who's lower [academically] that is a little bit better on the technology than someone who's higher and they're able to help that person, it does make them feel better, because they generally aren't the one who's able to help."
>
> "I have a boy that comes in from an SDC class who's mainstreamed. He does no homework, no work-work, but when we use the technology, when we're doing PowerPoints or projects or research, he loves that and he just blends right in like everybody else and he feels so good about himself."

Ethnicity. Three teachers commented that the use of technology in the classroom has benefited newcomers to the United States. By using programs such as Rosetta Stone and Reading Eggs, students have been able to practice their English and subsequently aid in their second language acquisition. "She likes that [Reading Eggs] and it's really the only thing that she's motivated at all to do and doesn't make an excuse not to do it." As students transition to their

new environment, the use of technology can serve as a comfort and aid in their assimilation.

> "I have a little girl who came from India and at the beginning she wanted to get on the computer. There was a website with the states and that helped her. Just seeing that she's blossomed a little bit and she's talking with the other kids to show that she's…you know, showing them games."

Summary of qualitative findings. The qualitative findings from the focus group meetings revealed the perspectives of the participating teachers regarding educational technology and student self-efficacy. The responses were analyzed using the same domain variables that were employed in the quantitative analysis. Both confirmatory and conflicting responses were given by the participating teachers. Specifically, most of the teachers reported that their students have positive attitudes concerning the use of technology both inside and outside the classroom. Teacher attitudes ranged from enthusiastic to frustrated, depending upon their comfort level and familiarity with technology. Age or years of experience did not influence whether or not the teachers implemented technology in their classrooms. Teachers reported that they use technology in every academic subject. However, it was rarely reported that it was used to create a product in math, only for concept and facts practice. These results will be discussed further in the following chapter.

Chapter 5
Conclusions and Implications

Summary of the Dissertation

Purpose. This dissertation was conceived with the intent of investigating a previously observed link between the use of educational technology in the sixth grade classroom and a high level of self-efficacy in the student. The researcher had noticed a difference when students used educational technology to complete class projects. This difference was related to the student's willingness to accomplish goals, problem solve, and manage failure. With the transition from traditional classrooms to 21st century classrooms within many districts, it is important to study the difference between these types of instructional techniques.

Literature review. The literature review was divided into three main components. First, the history of educational technology was briefly chronicled to elucidate the changes over the past century. Gender differences in relation to technology followed, noting several recent studies that highlighted how boys and girls each respond to educational technology. Finally, an overview of self-efficacy and related concepts was included in order to define the psychosocial constructs on which the study was based.

Findings

Research question #1. To what degree is the use of educational technology linked to sixth graders' high self-efficacy, as indicated by frequency of use? Correlation coefficients were run in SPSS to examine the link between the self-efficacy domain variables and the frequency of educational technology use indicated by students. Though correlations alone cannot determine causality

among the variables, examination of the frequency tables provided some elucidation in this area (Field, 2005).

Pearson correlation coefficients between frequency of educational technology use inside the classroom and confidence domain variables. A significant correlation between frequency of educational technology use inside the classroom and variables within the confidence domain occurred between the use of laptops and how students rate their learning in general ($p = .033$). Another significant correlation occurred between the use of laptops and whether or not students' confidence in their abilities changed in a positive way after they began using computers in the classroom ($p = .007$). These results indicate that the more frequently students use laptops in the classroom, the more their general confidence increased and a positive change in their confidence increased. Very few of the students use laptops on a daily basis ($n = 16$, 8.5%). It seemed more probable that Smart/Interwrite board use would emerge as a significant correlation, with daily use by more than half of the students ($n = 94$, 57.7%), but no significance emerged between the variables ($p = .642$, $p = .245$, $p = .857$). The difference between the laptops and the Smart/Interwrite board is that the students are active participants while using the laptops for concept practice. The Smart/Interwrite board may be used for instructional purposes by the teacher while the students passively listen.

Pearson correlation coefficients between frequency of educational technology use inside the classroom and self-efficacy domain variables. When frequency of educational technology use inside the classroom was

correlated with each of the three questions relating to self-efficacy, the second self-efficacy question, “When I am faced with any problem, I can usually solve it.” produced marginally significant or significant results. Laptops ($p = .056$) and the Smart/Interwrite board ($p = .036$) were the technologies that correlated with this question. The use of the Smart/Interwrite board was dependent upon the comfort level and technological skill of the teacher. If a teacher wasn’t comfortable using this technology, his or her students were excluded from this experience. As aforementioned in the confidence domain, the Smart/Interwrite board was used more often than the student laptops, possibly resulting in the more significant correlation between the Smart/Interwrite board and the students’ beliefs in their ability to solve problems. The students are more engaged during instruction with the use of a Smart/Interwrite board, as opposed to a traditional whiteboard, because of its multimedia features. Though students are still receiving instruction, the multimedia features appeal to the students more than a traditional whiteboard. Consequently, their beliefs in their abilities are encouraged through this engagement.

Pearson correlation coefficients between frequency of technology use outside the classroom and confidence domain variables. Outside the classroom, significance occurred between iPads and student confidence before using computers in class ($p = .032$). The relationship between using iPads and whether or not students’ confidence in their abilities changed in a positive way after they began using computers in class was also significant ($p = .039$). To interpret the first result, one must realize that these students evaluated

themselves as already confident, even before using computers in their classroom. The use of the iPad may or may not have contributed to this confidence. The questionnaire did not enquire about specific iPad use, and it is probable that many students are not using iPads for educational purposes outside of school. However, because a change in the students' confidence in their abilities was also correlated significantly with iPads, the use of iPads at home, whether or not the purpose was educational, has provided some additional exposure to technology for these students.

Smart phones also resulted in significance with how students rated their confidence in their learning in general ($p = .044$) and whether or not students' confidence in their abilities changed after they began using computers in the classroom ($p = .030$). Since smart phones are not used in the classroom for educational purposes, the use of this technology outside the classroom is an example of an influential device that transferred to these specific confidence variables. However, almost half of the students reported that they never use smart phones outside the classroom ($n = 77$, 47.2%).

Pearson correlation coefficients between frequency of technology use outside the classroom and self-efficacy domain variables. Within the self-efficacy domain, "When I set a goal, I usually accomplish it." was positively correlated with using iPods ($p = .032$), iPads ($p = .017$), and smart phones ($p = .043$) outside the classroom. Several explanations for these significant correlations exist. These three technologies are the newest and most novel of the six choices, possibly causing the students to rate them more favorably. In

addition, these technologies are not universally available for student use in the classroom, so students may prefer their use at home as opposed to laptops and desktops, devices that may be available in both settings.

Another significant correlation appeared between using iPads outside the classroom and the students' beliefs in their ability to solve problems ($p = .008$). As aforementioned, these students are using iPads outside the classroom, so it is impossible to know whether or not they are using them for educational purposes. Nonetheless, the iPad is having a positive effect on students' self-efficacy. Frequencies indicate that 67 students (40.1%) use the iPad every day, while 47 students (28.1%) never use an iPad.

Pearson correlation coefficients between frequency of educational technology use by academic subject and confidence domain variables. Within the confidence domain, several significant correlations emerged in relation to frequency of use in academic subjects. Using educational technology in writing was significantly correlated with students' confidence in their learning in general ($p = .043$) and whether or not their confidence in their abilities changed after they began using technology in their classroom ($p = .010$). Students' confidence in their learning and abilities may increase as they use technology more often in writing. Because most students are using computers in writing either "all the time" ($n = 60$, 33.1%) or "sometimes" ($n = 100$, 55.2%), it can be concluded that most of the population benefits from this use of computers. The use of computers during writing time is the simplest method for integrating technology into lessons, so more teachers are apt to use computers for writing

projects. Virtually no explanation is needed when students are asked to type an essay, so the pressure of designing and delivering an unfamiliar or uncomfortable lesson is eliminated.

Frequency of use in math is significantly correlated with students' confidence in their learning in general ($p = .044$). It is important to note that over half of the students ($n = 93$, 52.5%) reported never using computers during math time in class. This information was corroborated by the teachers during the focus groups. Many teachers said that they use computers for math concept or facts practice, but that can occur at any time of day. The implementation of math lessons that require computers is more daunting and deviates from the lessons outlined in the math textbook. Many teachers design creative math activities that promote conceptual thinking, but it can be difficult to incorporate the use of technology.

The use of technology in social studies and science lessons typically centers around the creation of PowerPoints to demonstrate mastery of content standards. Whether or not students' confidence in their abilities changed after they began using computers in the classroom revealed a correlation with use during social studies time ($p < .001$). In science, the variables were correlated ($p = .002$) as well. Slightly more students reported that they "sometimes" use computers in science ($n = 110$, 61.1%) than in social studies ($n = 95$, 53.4%). Because sixth graders study ancient civilizations such as Egypt, Greece, and Rome, many teachers already have established social studies activities that do

not involve computers. Science lessons lend themselves more easily to technology integration.

Pearson correlation coefficients between frequency of educational technology use by academic subject and self-efficacy domain variables. The frequency of educational technology use in writing ($p = .020$) and math ($p = .048$) significantly correlated with students' beliefs in their ability to accomplish their goals. As aforementioned, technology is integrated into writing lessons more readily than any other subject area. However, math is more difficult into which to integrate technology and is taught without technology by many teachers.

Using educational technology in writing was also significantly correlated with students' beliefs in their ability to solve problems ($p = .011$). When students use a word processing application such as Microsoft Word to publish their writing, they are faced with problems that must be solved. Sometimes the file won't open, their work is deleted, or the document won't save. Experience with these types of problems may function as mastery experiences to increase their self-efficacy (Bandura, 1986).

Research question #2. Which factors indicate the greatest difference between girls' and boys' self-efficacy? Independent samples t-tests were run to compare the means between girls and boys as they responded to the three questions within the self-efficacy domain. The questions within the confidence domain were also included to provide additional data.

Independent samples t-tests comparing gender differences within confidence domain variables. The independent samples t-tests that were run

to compare the mean responses between girls and boys resulted in no significance. During the teacher focus groups, this result was corroborated with the teachers' observations of their students. Many teachers responded that they observe no difference between the levels of confidence in their sixth graders. The age group of these students can be factored into the interpretation of these results. Since the sixth graders surveyed are still in elementary school, they are still relatively comfortable with the opposite sex. Some students are beginning to experience the attraction that accompanies the age, but adolescent sex roles are not quite evident (Gilligan, 1982). One teacher mentioned that some of her girls are starting to "dumb down" for the boys, but that attitude was imported with the arrival of a new student from a district in which the sixth graders were housed at a middle school. The confidence of the majority of the students in this study was neither positively nor negatively impacted by the opposite sex.

Independent samples t-tests comparing gender differences within self-efficacy domain variables. The independent samples t-tests that were run within the self-efficacy domain produced the only result that approached significance. "When things don't go as planned, I don't freak out." showed marginal significance (Levene's $p = .051$, two-tailed $p = .070$). The means between the girls' ($M = 2.91$) and boys' ($M = 3.12$) responses indicated that the boys are more likely to handle setbacks and failures in stride. These results contradict previous studies that focused on girls' calm demeanor. The researcher's experiences with sixth graders also contradicts these results. Girls

tend to accept failure more graciously than boys, who typically act embarrassed or insecure when confronted with unexpected outcomes.

Research question #3. Which external factors influence elevated self-efficacy, as perceived by the student? Multiple regression analyses were run to investigate this research question. The three self-efficacy variables within the self-efficacy domain were entered into SPSS separately as dependent variables. The independent variables included all variables within the other domains.

Stepwise multiple regression analysis of external influencing factors within self-efficacy domain variables. Some unexpected results surfaced after the regressions were run. Variables from the self-concept domain emerged as independent predictor variables. This result was surprising, as the self-concept domain variables were not anticipated to emerge as predictors. The researcher chose to concentrate on the self-concept domain in this discussion.

Dependent variable: "When I set a goal, I usually accomplish it." Two of the strongest independent variable predictors that emerged from this regression were "I am important to my class." (β = .361) and "I usually get good grades." (β = .149). This positive self-concept is obviously related to goal setting within the self-efficacy domain. Therefore, if students feel they are important to the class and they get good grades, they will meet their goals. Bandura's (1993) idea of collective efficacy can be observed. When students feel that they are part of a group and that group depends on them, they are more likely to attain success.

Dependent variable: "When I am faced with any problem, I can usually solve it." Two of the strongest independent variable predictors that emerged

from this regression were “I behave well and follow the rules at school.” (β = .214) and “I am important to my class.” (β = .193). One conclusion that can be drawn from these results include students who deem themselves well behaved are also adept problem solvers. Once again, the idea of Bandura’s (1993) collective efficacy is present in relating the importance of a student to his or her class to problem solving. Students may have interpreted problem solving differently during the completion of this question. Some students may have considered academic problem solving, while others may have recalled a time they had to solve a social problem. Nonetheless, the skills of problem solving are transferable among contexts.

Dependent variable: “When things don’t go as planned, I don’t freak out.” The strongest independent variable predictor that emerged from this regression was “I behave well and follow the rules at school.” (β = .236). When students are well behaved, or self-evaluate as well behaved, they are better able to handle unexpected situations. The well behaved student is typically calm and rational, qualities that would aid in navigating uncertainty.

Corroboration of student and teacher results. For most of the responses, the student and teacher results were aligned. Both students and teachers rated the students generally confident and efficacious. Most of the teachers replied that they use educational technology on a regular basis in all subjects, yet the student data do not corroborate this claim. Granted, a “regular” basis can be interpreted differently by different people, especially between children and adults. Because iPods and iPads are not utilized as an instructional

and practice tool in the participating classrooms, they may be viewed as more of a novelty rather than a commonplace, school-related item.

Implications for Future Research

This study lends itself to future research in the area of educational technology and self-efficacy. Each research question revealed its own implications, and those implications are detailed in the following sections.

State or national sample of sixth graders. Because only one district was sampled for this study, a major limitation was created. In future studies, a national sample of sixth graders would provide a more representative perspective from the students. However, this future study would be dependent upon whether or not the participating districts were equipped with 21st century technology. As more districts renovate their classrooms and update their technology, a national study would be more relevant.

As related to RQ #2, this state or national sample would need to include an almost equal distribution of girls and boys. Though little to no difference was uncovered between the level of self-efficacy between the girls and boys in this study, the delimitation of studying only one district may have factored into this result. Students in other districts with different educational philosophies may respond in a divergent manner.

Parent input. As an additional perspective, a focus group involving the parents of the participating students would provide insight into how technology is used in the homes of the students. Parents would be able to provide a more accurate description of the types of technology used in their homes. Sometimes

students are unsure of the devices that are available to them, both at home and at school.

Inclusion of Special Day Class (SDC) students. This study did not include SDC students because of the focus on sixth grade students. The SDC classes in the participating district are structured as multi-grade classrooms. These classrooms are equipped with the same educational technology as the general education classrooms. In addition, these students are involved in the READ 180 program for reading remediation. The special education students involved in this study have an IEP for either RSP or speech. However, in future studies it would be interesting to corroborate any recent studies surrounding the benefits of educational technology within the self-contained special education setting.

Comparison among districts. As more districts become 21st century equipped, it would be informative to conduct a comparison study among districts. Since there is no state or national standard concerning the implementation of specific technological devices, the individual district decides how to equip its classrooms with 21st century technology. Districts differ in their choice and quantity of devices available to teachers and students.

Inclusion of iPad-equipped districts. This study's participating district does not currently use iPads as a means of educational technology. The students who responded that they use iPads on a regular basis use them outside the classroom. The significant correlations observed under RQ #1 implicate the study of a district that uses iPads in class to determine a possible difference

between home and school use. Possibly, this future study would uncover both educational and recreational use of the iPad at home.

Longitudinal study. As technology rapidly changes, the related research cannot remain stagnant. An informative study would include the examination of new devices as they are released and implemented as tools in educational technology. The results from this study implicate a longitudinal study to track changes or improvements in the participating students' self-efficacy or technology use.

Level of teachers' technological self-efficacy. An additional component to this study would be a questionnaire to determine the teachers' level of technological self-efficacy. This questionnaire would be completed by the teachers. Correlating this variable with frequency of use would yield some informative data, possibly relating teachers' high technological self-efficacy with more frequent use of technology inside the classroom.

Implications for Educational Policy

As the data analysis concluded, implications for educational policy became apparent. The following sections detail several recommendations for implementation of programs or ideas that resulted from this study.

iPads. The quantitative data revealed positive correlations between using iPads outside the classroom and the self-efficacy domain variables. As aforementioned, experimenting with the use of iPads inside the classroom for educational purposes may yield the same significance. As with other educational

technology, this implementation would depend upon the comfort level and technological knowledge of the teacher.

Technology use in math. The positive correlation between technology use during math time and accomplishing goals indicates that the students who are currently using technology in math feel confident about their success. Though the frequency tables indicated that very few students use technology in math, it may prove beneficial. Because teachers are already overloaded with lesson planning and adjunct duties, the district may investigate hiring a teacher hourly to develop some technology-based math lessons. This teacher would then share the lessons with his or her peers to facilitate implementation. In a perfect world, devoid of budget constraints, the teacher would also be hired to demonstrate the technology-based math lessons in selected classrooms.

Professional development and/or teacher prep time. During the focus groups, many teachers commented that though they are equipped with technology such as Smart/Interwrite boards and student laptops, they do not have the time to explore and develop new lessons that would integrate these technologies. Providing professional development to share ideas and teacher prep time either during the school day or after school would offer teachers time to develop and deliver lessons that integrate new technologies.

Lesson Study. Within the professional development vein, lesson study is a collaborative group effort to design and execute a specific lesson. Because of the significance of the self-concept independent variables that emerged from the multiple regression analyses, teachers may benefit from the collaboration of

lesson study. The collaborating group researches a concept, designs an avenue through which to present it to students, then one teacher delivers the lesson. As the teacher is teaching, the other members of the group critique the effectiveness of the lesson, not the performance of the teacher. When the group meets again to debrief, the lesson is deconstructed and the assessment results are analyzed.

In relation to RQ #3, implications for promoting positive self-concept are evident. Activities that give students an opportunity to demonstrate their intelligence or importance include group investigations in any subject area. These group projects also promote collective efficacy and agency within the classroom setting. Designing and refining these lessons as a group, teachers would be able to track their success or failure.

Technical support. Several of the teachers reported that the technology in their classroom is unreliable. In order for the teachers to utilize the available technology and spend time developing lessons that integrate it, teachers must have the assurance that the technology will function properly. Technical support must be immediately available to teachers if a malfunction occurs in their classroom.

Researcher's Conclusions

After data analysis and interpretation was complete, the researcher observed some final conclusions.

Causality. Though it is impossible to determine causality from the correlations, t-tests, and regressions that were run to analyze the data, the researcher's experience and observations have aided in drawing some

conclusions. The researcher has worked with elementary school students for 14 years, nine of those years instructing sixth graders. Based on this teaching experience as well as the experience of integrating educational technology into lessons, the use of educational technology does affect a student's self-efficacy in a positive direction. The students feel more empowered and familiar with the materials required to complete the assigned task if they use the materials on a regular basis.

Digital natives. The students involved in this study definitely fit the definition of digital natives. Some of them even questioned why someone would be interested in technology's effect on students. It is odd to them that technology would be considered a novelty. As mentioned in the literature review, technology is so commonplace for this generation (Palfrey & Gasser, 2008) that many of the students seemed puzzled as to why the topic would merit a study in the first place. Veteran educators can recall the introduction of technology into the teaching realm, but these student participants were born around the year 2000-2001, a time when technology was already commonplace. As evidenced through the data, teachers integrate a varied amount of educational technology into their lessons. This inclusion or omission of technology can either comfort the student or alienate them from the lesson being taught.

Access. The participating students have been exposed to different degrees of technology both inside and outside the classroom. The results of this study indicated that about half of the sample qualified for free or reduced lunch status. Socioeconomic status can be implied from this qualification. Schools

must realize that some students' sole exposure to technology occurs inside the classroom. If students are not exposed to technology in the home, it is the duty of the school to facilitate this competence.

Gender stereotype. The literature identifies a gender stereotype related to technology (Veriki, 2010). This study did not identify a gap between the boys and girls involved. Neither the questionnaire nor the focus group data revealed an imbalance in technology's effect on self-efficacy. Though traditional gender stereotypes exist, it is possible that these stereotypes are becoming obsolete. Granted, the age group may have factored into this conclusion, but hopefully we will observe a continuation of equity among boys and girls as they advance through school and career.

Triadic reciprocal determinism. The reciprocity among personal, environmental, and behavioral factors as they relate to this study are an important consideration. Though these three factors are constantly in flux (Bandura, 1986, 1997), they represent the variables that contribute to students' high self-efficacy. Issues such as socioeconomic status and special education may serve as personal factors. Environmental factors may include access to and different types of technology. Attainment and level of self-efficacy may be behavioral factors. The reciprocity among these factors ultimately determines a student's academic and career success.

Technology in mathematics. Perhaps most passionate to the researcher is the use of educational technology during mathematics instruction. Because she recently completed three years of professional development in

conceptual mathematics through a state grant, she strives to develop math lessons that integrate technology whenever possible. Though the conceptual, technology-infused math lesson is a departure from the traditional math lesson, its rewards are numerous. When students comprehend a mathematical concept in its deepest context, they are not only prepared to achieve at a higher academic level, they also possess the understanding required to think and assess situations critically.

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Appendix A

Student Questionnaire

(created with Survey Monkey)

Dear Student,

Please answer the following questions as honestly as possible. If you don't know, please choose the answer that best relates to you. If a question makes you feel uncomfortable, you may skip it or exit the survey. The main terms used in this survey are: technology (computers) and confidence (how you feel about yourself and your abilities, knowing you can do something). Thank you for your participation.

1. How often do you use the following types of technology ***in your classroom***? Click all that apply.

Laptop computers	Every day	A few times a week	A few times a month	Never
Desktop computers	Every day	A few times a week	A few times a month	Never
Smart or Interwrite board	Every day	A few times a week	A few times a month	Never
Clickers	Every day	A few times a week	A few times a month	Never
Other (please specify): _____	Every day	A few times a week	A few times a month	Never

2. How often do you use the following types of technology ***outside of school***? Click all that apply.

Laptop computer	Every day	A few times a week	A few times a month	Never
Desktop computer	Every day	A few times a week	A few times a month	Never
iPod or other music device	Every day	A few times a week	A few times a month	Never
iPad or similar device	Every day	A few times a week	A few times a month	Never
Smart phone	Every day	A few times a week	A few times a month	Never
Video games	Every day	A few times a week	A few times a month	Never
Other (please specify): _____	Every day	A few times a week	A few times a month	Never

3. Before this school year, how often did you use computers in school? Click one answer per row.

5th Grade	Every day	A few times a week	A few times a month	Never	I can't remember.
4th Grade	Every day	A few times a week	A few times a month	Never	I can't remember.
3rd Grade	Every day	A few times a week	A few times a month	Never	I can't remember.
2nd Grade	Every day	A few times a week	A few times a month	Never	I can't remember.
1st Grade	Every day	A few times a week	A few times a month	Never	I can't remember.
Kindergarten	Every day	A few times a week	A few times a month	Never	I can't remember.

4. What is your feeling about talking in front of the class? Click one answer.
   - Love it!
   - It's okay.
   - Hate it!

5. What is your attitude toward using computers and other devices at school? Click one answer.
    - Love it! Computers help me learn.
    - It's okay. Sometimes computers help me.
    - Hate it! Computers don't help me at all.

6. How often do you use computers in the following subjects? Click one answer per subject.
    - Reading: all the time sometimes never
    - Writing: all the time sometimes never
    - Math: all the time sometimes never
    - Social studies: all the time sometimes never
    - Science: all the time sometimes never

7. My learning improves when I complete an assignment with computers. Click one answer.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree

8. Please rate how you feel about your learning in general. Click one answer.
    - Completely confident in my abilities
    - Somewhat confident in my abilities
    - Somewhat lacking in confidence in my abilities
    - Not confident in my abilities

9. Before I began using computers in class, I was a pretty confident person. Click one answer.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree

10. My confidence in my abilities changed in a positive way after I began using computers in my classroom. Click one answer.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree

11. In which situations do you feel most confident? Click one answer.
    - At school inside the classroom
    - At school outside the classroom
    - At home
    - With friends in my neighborhood
    - Other
12. School is easy for me.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree
13. I usually get good grades.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree
14. I behave well and follow the rules at school.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree

15. I am important to my class.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree
16. When I set a goal, I usually accomplish it. Click one answer.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree
17. When I am faced with any problem, I can usually solve it. Click one answer.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree
18. When things don't go as planned, I don't freak out. Click one answer.
    - Completely agree
    - Somewhat agree
    - Somewhat disagree
    - Completely disagree

19. What is your gender? Boy Girl

20. Do you receive free or reduced lunch? Yes No

21. Do you receive special education services (RSP, speech, or SDC)?

Yes No

22. What is your ethnicity? Click all that apply.

African American/ Black	Anglo/White	Asian American/ Asian	Latino/Hispanic
Native American/ Alaskan Native	Pacific Islander	Other (please specify): _____	

23. Is there anything else you would like to share about how you feel when you use computers? Type your answer in this box.

Thank you for your time!

Appendix B

Focus Group Agenda

<date>

<time>

<location>

1. Welcome & Introductions
2. Goal of meeting: Teachers will share their perspectives of technology use in their own classroom and how it affects their students' self-efficacy (belief in own abilities).
3. Ground rules: Allow for equal participation by all teachers ("round robin" format)
4. Discussion

   Questions to guide discussion:

   - What types of educational technology do you use in your classroom?
   - What has been the general student response to technology? What specific devices do they respond to?
   - Please describe your students' attitudes toward technology.
   - How comfortable are you with technology?
   - Do you think you would use more technology in your teaching if you had a higher level of comfort?
   - In which subjects do you use technology?
   - What is the general level of self-efficacy in your classroom?

- Have you noticed an improvement in your students' self-efficacy since you began using technology in your classroom?
- What are the differences between males and females in your classroom in relation to self-efficacy?
- Please describe any specific examples of high self-efficacy as a result of technology use in the classroom.

5. Wrap-up

Appendix C

Parent Consent Form

Informed Consent Form for "Evaluating Sixth Graders' Self-Efficacy in Response to the Use of Educational Technology"

Your child is being asked to participate in a research project conducted by Anne Castagnaro in the School of Educational Studies at Claremont Graduate University (CGU). Your child is being asked because he or she is a sixth grade student in the Upland Unified School District.

PURPOSE: The purpose of this study is to discover how educational technology affects students' self-efficacy. Self-efficacy is a belief in one's own ability to achieve goals.

PARTICIPATION: Your child will be asked to complete an online questionnaire which will ask questions about their exposure to technology (computers and other classroom electronics) both in and out of the classroom. This questionnaire will be administered at school, on a school laptop, through a website (Survey Monkey) provided by your student's teacher. I expect participation to take about 15 minutes of your child's time. Some sample questions include: What is your attitude toward using technology at school? In which situations do you feel most confident? When I set a goal, I usually accomplish it (agree/disagree). When I am faced with any problem, I can usually solve it (agree/disagree).

RISKS & BENEFITS: Since the questionnaire will ask students to rate their level of confidence, one risk anticipated while completing the questionnaire is the possibility of discomfort or temporary decrease of self-esteem. If your child feels uncomfortable with any specific question, he or she is not required to answer it. He or she may skip any uncomfortable questions or exit the survey. I expect the project to benefit your child by allowing him or her to reflect on personal feelings toward using technology in the classroom. In addition, I expect this research to benefit the field of education by examining the effect of recently purchased technology on sixth graders' beliefs in their abilities.

COMPENSATION: Neither you nor your child will be compensated for your child's participation.

VOLUNTARY PARTICIPATION: Please understand that participation is completely voluntary. Your decision whether or not to participate will in no way affect your current or future relationship with CGU or its faculty, students, or staff, as well as any relationship with the Upland Unified School District. Your child has the right to withdraw from the research at any time without penalty. Your child also has the right to refuse to answer any question(s) for any reason, without penalty.

CONFIDENTIALITY: Your child's individual privacy will be maintained in all publications or presentations resulting form this study. Your child's name will not be associated with his or her responses, as the questionnaire is completely anonymous. Gender, free/reduced lunch status, and ethnicity will be asked, but will not be used to seek identities of students. Through Survey Monkey, the IP address identification function has been disabled, meaning no specific survey can be traced back to a specific computer. If a particular student's responses are referred to in the report, he or she will be assigned a false name. In order to preserve the confidentiality of your responses, access to the responses will be limited to the researcher and the dissertation committee (3 professors) at CGU. No person associated with Upland Unified School District (with the exception of the researcher) will have access to the responses.

If you have any questions or would like additional information about this research, please contact me at *(909) 949-7800 x103*, *anne.castagnaro@cgu.edu, or 601 N. Fifth Ave, Upland 91786*. You can also contact my research advisor, Dr. Philip Dreyer at *(909) 607-1239, philip.dreyer@cgu.edu, or Harper Hall 207, School of Educational Studies, Claremont Graduate University, Claremont 91711*. The CGU Institutional Review Board, which is administered through the Office of Research and Sponsored Programs (ORSP), has approved this project. You may also contact ORSP at (909) 607-9406 with any questions.

This study and its procedures have been approved by the Claremont Graduate University Institutional Review Board. This Board is responsible for ensuring the protection of research participants.

A signed copy of this consent form will be given to you.

I understand the above information and have had all of my questions about my child's participation in this research project answered. I voluntarily consent to my child's participation in this research.

Signature of Parent _____Date _____

Printed Name of Parent _____

Signature of Researcher _____Date _____

Appendix D

Student Assent Form

Informed Assent Form for
"Evaluating Sixth Graders' Self-Efficacy in Response to the Use of Educational Technology"

My name is Anne Castagnaro, and I am from the School of Educational Studies at Claremont Graduate University (CGU). I am asking you to participate in this research study because you are a sixth grader in the Upland Unified School District.

PURPOSE: In this study, I am trying to learn more about how using computers and other technology in the classroom affects self-efficacy. Self-efficacy is how you feel about your abilities, similar to confidence.

PARTICIPATION: You will do the following in your classroom: At a time that is convenient for your teacher, you will go to the website surveymonkey.com and complete a questionnaire. This questionnaire will ask you questions like: What is your attitude toward using technology at school? In which situations do you feel most confident? When I set a goal, I usually accomplish it (agree/disagree). When I am faced with any problem, I can usually solve it (agree/disagree). All of this should take about 15 minutes.

RISKS & BENEFITS: You might feel uncomfortable when you answer some of the questions. If you feel uncomfortable with any question, you may skip it or exit the survey. Your teacher and principal will never see your answers. You may benefit from participating by learning something new about yourself.

VOLUNTARY PARTICIPATION: I have also asked your parents if it is okay for you to participate in this study. Even though I asked your parents, you still get to decide if you want to be part of this research study. You can also talk with your parents, grandparents, and teachers (or other adults, if appropriate) before deciding whether or not to take part. No one will be upset if you do not want to participate, or if you change your mind later and want to stop. You can skip any of the questions you do not want to answer.

You can ask questions now or whenever you wish. If you want to, you may call me at *(909) 949-7800* or email me at *anne.castagnaro@cgu.edu.*

Please sign your name below if you agree to be part of my study. I will give you and your parents a copy of this form after you have signed it.

Signature of Participant _____Date _____

Name of Participant _____

Signature of Researcher _____Date _____

Appendix E

Teacher Consent Form

Informed Consent Form for
"Evaluating Sixth Graders' Self-Efficacy in Response to the Use of Educational Technology"

You are being asked to participate in a research project conducted by Anne Castagnaro, in the School of Education at Claremont Graduate University (CGU). You are being asked because you meet the selection criteria of holding the position of sixth grade teacher in the Upland Unified School District.

PURPOSE: The purpose of this study is to discover how educational technology affects students' self-efficacy. Self-efficacy is a belief in one's own ability to achieve goals.

PARTICIPATION: You will be asked to meet in a focus group on <date> at <time> at <location>. During this focus group you will be asked to discuss your students' technology use in your classroom and how you think it affects their self-efficacy. I expect your participation to take about 15-20 minutes of your time. Some sample questions include: How is technology used in your classroom? What has been the general student response to technology? What is the general level of self-efficacy in your classroom? What are the differences between males and females in your classroom in relation to self-efficacy? What are some specific examples of high self-efficacy as a result of technology use in the classroom?

RISKS & BENEFITS: No potential risks are anticipated, with the exception of time inconvenience. I expect the project to benefit you by allowing reflection and discussion of technology use in your classroom. In addition, I expect this research to benefit the field of education by examining the effect of recently purchased technology on sixth graders' beliefs in their abilities.

COMPENSATION: You will not be financially compensated for your participation.

VOLUNTARY PARTICIPATION: Please understand that participation is completely voluntary. Your decision whether or not to participate will in no way affect your current or future relationship with CGU or its faculty, students, or staff as well as any relationship with the Upland Unified School District. You have the right to withdraw from the research at any time without penalty. You also have the right to refuse to answer any question(s) for any reason, without penalty.

CONFIDENTIALITY: Your individual privacy will be maintained in all publications or presentations resulting form this study. You will be assigned an alias for purposes of identification. Only the researcher will know the true identity of each teacher. Your interview will be audio recorded and transcribed to ensure the inclusion of all important data. The digital file will be deleted upon the completion of the project. In order to preserve the confidentiality of your responses, access to the responses will be limited to the researcher and the dissertation committee (3 professors) at CGU. No person associated with Upland Unified School District (with the exception of the researcher) will have access to the responses.

If you have any questions or would like additional information about this research, please contact me at *(909) 949-7800 x103*, *anne.castagnaro@cgu.edu, or 601 N. Fifth Ave, Upland 91786*. You can also contact my research advisor, Dr. Philip Dreyer, at *(909) 607-1239, philip.dreyer@cgu.edu, or Harper Hall 207, School of Educational Studies, Claremont Graduate University, Claremont 91711*. The CGU Institutional Review Board, which is administered through the Office of Research and Sponsored Programs (ORSP), has approved this project. You may also contact ORSP at (909) 607-9406 with any questions.

This study and its procedures have been approved by the Claremont Graduate University Institutional Review Board. This Board is responsible for ensuring the protection of research participants.

A signed copy of this consent form will be given to you.

I understand the above information and have had all of my questions about participation in this research project answered. I voluntarily consent to participate in this research.

Signature of Participant _____Date _____

Printed Name of Participant _____

Signature of Researcher _____ Date _____